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The difficulty of the prognosis of pulmonary tuberculosis is so well established in medical literature that it is the theme of gloomy aphorisms by every well-known writer on chest diseases in the latter half of last century. Samuel Gee summed up his ideas by saying: "Never attempt to forecast the probable duration of life in the case of phthisis. In this connexion there is only one thing that is sure, and that is, that if you do you will be wrong."

Even if an attempt was made at forecast in any individual case it was founded on mode of onset, while in type of established lesion it was, at best, only vaguely comparative. C. T. Williams and C. J. B. Williams (1897) are as dogmatic as any chest physicians of their own time in saying: "Acute phthisis is generally hopeless, while catarrhal phthisis, which is a primary feature of the tendency to excavation and the comparative absence of fibrosis, runs a less favourable course and a less limited duration compared with that of other chronic varieties, and especially fibroid"; and again: "It is in chronic tuberculous phthisis that the greatest triumphs of treatment have been attained when time, money, and perseverance are not lacking, and we can in most cases promise prolongation of life, and in others complete arrest of the disease. The patients who trace their diseases to pleurisy seem to have the best chances of life." This was no advance as against the statement of Fuller in 1862, when he said: "It can safely be said that the disease may kill in three weeks or a month from the date of its accession, or may run a chronic course of 20 or 30 years." Even at the beginning of this century while Samuel West (1902) went so far as to state: "There is never any immediate danger to life unless with an onset of pneumothorax or hæmorrhage," his prognostic ideas were that: "Perfect cures are impossible, complete arrest cannot be expected in more than one or two per cent., and all we can hope for is that the progress will be held up by treatment."

All statements on the prognosis of phthisis are finally founded on the experience of the individual observer, restricted by current methods of diagnosis and treatment of the prevalent type of the disease. There is no reason to decry the pronouncements of these eminent physicians. Since their time we have advanced in methods of diagnosis, enormous strides have been made in treatment, from rest under sanatorium conditions up to active intervention by artificial pneumothorax and thoracoplasty, while we have the benefits of careful after-history reports, and in recent years the development of laboratory aids from blood examinations. Moreover, we have no reason to crow over them even if we feel so inclined, for we are dealing with a disease in the majority of sufferers much more chronic than they encountered, with far less incidence of dangerous complications such as laryngeal involvement, more amenable to any form of treatment and often cured by none that we can claim part in, but even now too often already established to gross extent before our boasted advances have discovered its presence, so that we have missed what is of primary importance in both immediate and ultimate prognosis—an early diagnosis.

Such changing type of disease, together with further aids to assessment of lung destruction, especially radiography, led by natural consequence to the founding of prognosis much more on the extent of involvement than on the evidence of constitutional disturbances, until the latest report from Frimley Sanatorium (1935) is able to show that: "The prognosis of chronic pulmonary tuberculosis varies directly with the extent of lung involved."

Sanatorium Treatment

The first work of any real value on the after-histories of patients treated on particular lines was that of Bardswell and Thompson in 1919. They made an intensive actuarial study of the experience of patients treated at Midhurst Sanatorium; their methods of "follow-up" were so thorough that only minor improvements have been suggested, and their general conclusions have been, in the main, only strengthened by the many more recent investigations on similar lines.

Thus it is now accepted that mortality after sanatorium treatment is governed to a great extent by the condition in the first and second years after discharge, the two main factors being the comparatively early death of advanced cases, and the willingness or capacity of the patient to continue on the routine of life he has been taught during his residence. Not that this latter is any real new discovery; it is but a statistical verification of Fuller's statement that: "It is neglect of rational means to sustain the general health for a sufficiently long time after improvement has commenced . . . which leads to the fearful mortality from phthisis."

Bardswell's figures showed that in cases that remain tubercle positive at the end of sanatorium treatment the ratio of actual deaths to the deaths expected is for males 21·8 in the general population, and for females 31·6. In cases which never had tubercle bacilli demonstrated in their sputum during their stay in the sanatorium, he found the ratio to be 6·5 and 7·7 respectively. Clarke (1932) traced the after-histories of 700 patients of the Foster Green Hospital, Belfast; at the end of the 6th year after discharge only 22 per cent. positive sputum cases as against 72·5 per cent. negative cases were still alive. An investigation on 1700 patients treated at Midhurst Sanatorium between 1911 and 1929 (Trail and Stockman 1931) gives results which can be stated in slightly different form. The proportion alive 5 years after admission with positive sputum works out as follows for both sexes and all age-groups combined, as based on the Turban-Gerhardt classification: Group I, 86·5 per cent.; Group II, 66 per cent.; Group III, 43 per cent. Although these percentages necessarily refer to a class of patient with advantages, both social and economic, in after-care as against the average working-class admissions to the public sanatoria of this country, they bear a very close resemblance to published statistics throughout Europe and America, and state fairly accurately our present knowledge of the general prognosis for a given stage of the disease at the time of diagnosis. It must be very clearly understood, however, that they refer only to those sufferers willing and fortunate enough to be treated

* The Mitchell lecture for 1936 delivered before the Royal College of Physicians of London on Nov. 12th.

in a sanatorium. The Frimley report states: "We believe this to be the first occasion on which statistical evidence has been produced to show the value of sanatorium treatment." The graphs provided demonstrate "that the mortality experience of patients who have had the advantage of a course of sanatorium treatment is more favourable than that of members of the general population suffering from Pulmonary Tuberculosis." This conclusion had been hinted at by the workers of the Prussian and Hessian Railway Sanatorium who had found from the after-history of patients in Group I and Group II followed up to a period of 4–6 years from the date of diagnosis, that fully 20 per cent. more were alive amongst sanatorium treated patients.

At the end of his report Bardswell expressed the opinion that something further than sanatorium treatment was necessary if the prognosis of phthisis was to be materially improved; it is a striking corollary that the last published sanatorium report (Hartley 1935) proves that there is a very little change in the outlook of the average chronic case over the past thirty years. As we have already seen, and will discuss more fully later, the crux of the problem lies in the difficulties of after-care, and of the differentiation in prognosis amongst patients of like social conditions and apparently similar extent of disease.

Collapse Therapy

Shortly afterwards there began the accumulation of a vast experience of collapse therapy from artificial pneumothorax up to thoracoplasty, and later of intermediate measures of paralysis of the diaphragm through operations of crushing, cutting, and evulsion of the phrenic nerve.

ARTIFICIAL PNEUMOTHORAX

Twenty years ago pneumothorax was hailed as the greatest advance in therapy since the institution of sanatorium treatment. Even 14 years ago when Burrell and MacNalty (1922) produced their monograph under the ægis of the Medical Research Council opinions on its value were unanimously favourable, and its occasional dramatic success in the advanced case gave it a value still hard to undermine. The present brings more sober judgment, relegates it to special conditions and the treatment of particular symptoms in the early and moderately advanced stages of the disease, and tries, still with small success, to depose it from the false position of a panacea and the last hope in a late diagnosis of established fibrotic lesions.

Much of the still present hopefulness comes from insufficient study of the material for investigation, and the deduction of false conclusions from the comparison of conditions essentially unlike. We now realise that the indications for the induction of pneumothorax immediately, and per se, relegate the patient to a particular category completely apart from his neighbour with evidently similar extent of disease, that his individual symptoms or his particular blood picture which do not alter with ordinary measures under supervised rest routine, automatically place him in a lower grade for both immediate and ultimate prognosis. We have learned that should we, in our well-meant enthusiasm, submit a patient to such treatment without due consideration of the amount of tissue destruction present at induction, or do not take to heart the lessons which the first few weeks of its continuance can teach us, we may not only fail in our efforts to arrest the disease, but be the cause of dangerous complications which hasten death and preclude him from the advantages he might have received from surgery.

An investigation carried out at Midhurst Sanatorium (Trail and Stockman 1932) showed that a Group I case has a definitely better prognosis under pneumothorax than under ordinary sanatorium treatment, but while it warrants a similar conclusion in the average Group II case, it does not encourage its employment in Group III. Moreover the figures quoted reflect the gravity of cases considered for induction in the lower categories, for even where continued treatment was possible 22 per cent. of Group II and 42 per cent. of Group III cases were dead at the end of a period averaging 5 years from the date of discharge from the sanatorium. They also teach us that in all probability some might have had a distinctly better chance of survival if they had been submitted for thoracoplasty either at the time of induction, or when it was recognised that continued treatment was producing inefficient collapse.

This does not detract from the enormous value of pneumothorax within its prescribed indications; every country has provided us with evidence of the brightening of prognosis since its introduction, and an excellent digest can be found in the monograph where Bentley (1936) reviews the experience of the London County Council and attempts to assess the value of the treatment by comparing the fate in 677 cases with that of 3329 treated by conservative methods only. He shows that there is a gain of 129·53 lives at the end of 3 years; that is, an increase of 19·1 per cent. in the number alive over the expected number amongst those conservatively treated. A smaller group followed for five years shows a gain of 18 per cent. at the end of 3 years and of 19·8 per cent. at the end of 5 years.

Similar results are seen in the Frimley report which compares very carefully ordinary sanatorium treatment with sanatorium treatment plus pneumothorax in patients in categories as nearly alike as can be reasonably assessed, and proves that the probability of survival is materially increased in those so treated; even cases relegated to the worst category of Group B III at the time of induction can show a higher survival-rate than a control group derived from all groups combined. What is still more interesting is that the treatment is shown to confer benefits enduring for at least 12 years and presumably for a longer period.

A Midhurst series (Trail 1934) followed up over a period of from 3–9 years after discharge gives 80 per cent. alive; since 70 per cent. of these patients were at best only comparable with Group II cases on ordinary sanatorium routine, it follows that successful pneumothorax conferred an added chance of survival of some 20 per cent. up to a period, on an average, 5 years from the anniversary of the date of discharge.

This percentage can be very materially improved in the near future. The present judgment of the treatment as to its power to improve prognosis is based, for the most part, on a type of case we now see to be primarily unsuitable. If the results of the London County Council, of Frimley and Midhurst Sanatoria, of Burrell and Fenton's cases (1930), and of a series collected by the Joint Tuberculosis Council are added together, it is seen that of 2872 cases fully 60 per cent. were already bilateral at the time of induction. Bentley's report shows that the presence of even only slight contralateral disease materially reduces the chances of survival, and that while we must aim at complete collapse of the lung in every case, even incomplete collapse in a unilateral

case gives a better end-result than complete collapse where bilateral disease is present.

THORACOPLASTY

If we are agreed that the indications for pneumothorax place the patient in a definitely lower category and that we must therefore read our ultimate results in this light, the same argument, but in greater degree, must apply to present statistics of surgical collapse. We see a changing attitude to the lesser measure which will, in the next ten years, most surely again enhance our opinion of its value as we apply the lessons of our mistakes in choice and management; in like fashion we must remember that the major measure has suffered in the past from the expectancy of the impossible from thoracic surgeons, most of whose results to date represent the attainments of a still rapidly developing technique practised on cases submitted as last hopes by despairing physicians.

Even then the results are heartening. The combined figures of Archibald and Bull in America, of Gravesen in Denmark, and of Franke, Kaystrom, and Scherdtler in Germany can claim that 42·3 per cent. of 1160 patients with thoracoplasty have been able to work without signs of disease for at least a year, and Sauerbruch (1936) has had 40·6 per cent. permanent cures among patients derived from every social class in Germany. Tudor Edwards (1928) was able to claim even eight years ago that 37·3 per cent. of his cases were alive and well, and that a further 17 per cent. were much improved. The importance of such an advance in therapy is perhaps better understood by comparing the results of treatment at the Vejlefjord Sanatorium (Gravesen 1932) between 1901 and 1930 in Group III positive sputum cases; only 19 per cent. of 1687 cases on ordinary sanatorium routine as against 34 per cent. of 170 thoracoplasties became tubercle free.

It seems only reasonable to hope that with advancing surgical technique, the provision of adequate surgical units, and the better choice of case, the prognosis of the patient with advanced unilateral disease will be improved by some 50 per cent. in the next 10 years. The realisation of this hope must lie with the physician, as on him must continue to fall the brunt of selection. He has now learned from experience in his patients what animal experiments had previously demonstrated that he need not fear more ultimate functional disturbance from collapse by rib resection than from complete compression by air. He has seen that there is now a method of diminishing the continual auto-intoxication from secreting cavities, and a reasonable hope of their ultimate closure by the relaxation of lung parenchyma and the consequent fillip to fibrosis through congestion and limitation of lymphatic circulation, which artificial pneumothorax cannot always attain. He must therefore in the future be more fair to his patient and to the surgeon, neither in his enthusiasm submitting the former to operation while his disease is still exudative and his mediastinum unstable, nor expecting the latter to come in only when he himself has been so conservative as to hang on to an inefficient pneumothorax until resistance has been seriously undermined.

Much must depend on the attitude of the physician to the treatment of cavitation. To say that he must become more surgically minded, that he must admit we have proved by sad experience the fallibility of the still too prevalent dictum that an attempt at pneumothorax must necessarily precede thoracoplasty does not mean that he must submit every case to operation without the most careful and individual consideration, but it does mean that he has been inclined in several cases to expect too much from sanatorium treatment or incomplete pneumothorax, with consequent waste of valuable time to the patient and useless expense of public money.

The prognosis of cavitation is hedged about by the most contradictory evidence. West could quote many cases with such lesion established to stethoscopic examination that lived up to twenty or more years, but he also says: "It is the acute case that recovers and the chronic comparatively quiescent case that has a sudden fatal exacerbation." If modern methods of diagnosis show that a large number of such deaths must have occurred, as they still occur, by miliary spread from unsuspected cavity formation, they also show why in one patient we may expect quiescence, in another every prospect of complete closure by rest, while in still another we must use every endeavour to attain such results by surgical treatment.

New Methods of Examination

Apart from such aids to assessment of activity and to the consequent wisdom or necessity of active intervention as the history, the amount and bacillary content of the sputum, the temperature, and the extent and nature of the lesion to physical and X ray findings can give us, we have now further guides in serial radiographic examinations and laboratory tests carried out on the peripheral blood.

In 1921 Dr. Arthur Latham uttered his protest on the dangers of individualisation of prognosis on the extent of lung involvement alone by saying: "The extent and character of physical signs is of little assistance in determining the activity of the disease; the important things are the degree of toxæmia and the response of the individual." This was no mere return to the statement of West: "Constitutional symptoms show, if present, that the disease is active and their amount forms a measure of that activity; if they are absent the disease is either stationary or progressing very slowly." In the light of present knowledge such a dictum is seen to contain all the inherent fallacies of proverbs founded on half-truths. The problem that exercised Latham has had some answer in the last fifteen years. The insidiousness of the disease and its liability to symptomless spread, both before its first clinical manifestations and after its apparent quiescence, have been demonstrated by Wingfield's work on serial X rays, while valuable evidence is continually accumulating on the power of the peripheral blood to indicate the individual potential resistance, toxæmia, and state of metabolism since the pioneer experiments of Medlar, Sabin, and Westergren.

THE SEDIMENTATION-RATE

An article published by Westergren in 1921 resuscitated an interest in the sedimentation of the red blood-cells that can be traced back to Galen, who first described the "crusta sanguinis" that was later to become the "buffy coat" behind the theory of blood-letting. Westergren demonstrated that citrated blood when placed in a tube and left for an hour shows a layer of clear plasma above the sedimented red cells, in health measuring about 2 mm. high for males and about 5 mm. for females; although the limits of normality have been found to be wide, his figures stand as an accepted average. Later he gave the necessary impetus to a vast amount of work on the value of this sedimentation-rate as

an aid to assessment of individual prognosis by suggesting that it would be "interesting to test the influence of the tuberculous infection on its stability."

Most observers are agreed that the test is of little value in diagnosis, although Cutler (1932) points out that it can indicate the presence of serious disease, not infrequently before such disease can be recognised by the usual clinical and laboratory methods. In 5000 patients with raised rates, he found only 5 without some definite pathological condition. In 1926, 360 consecutive admissions to Midhurst Sanatorium were investigated (Trail and Stone 1929). Of these, 318 were clinically tuberculous, and 97 per cent. of them gave an increased sedimentation-rate; the remaining 42 were clinically non-tuberculous, but 31 per cent. gave a raised rate, which indicates that while an acceleration may be used in conjunction with clinical findings in diagnosis, other chest conditions give a high percentage of abnormal results, while a definitely tuberculous case may give a normal figure.

Much of the work has been carried out in sanatoria, and has agreed in general with Roche's summary (1932) that: "The blood sedimentation-rate is of proven value in the management of cases of pulmonary tuberculosis." Clegg (1929) and Cutler (1932) believe it to be an accurate measure of the activity of the lesion, and as important as pulse, weight, and temperature. It may also be an index to the necessary duration of treatment (Trail 1933) and of the necessity to change its type by forewarning us of the onset of complications such as spread of disease before their usual clinical manifestations are present. Bernard (1931) considers it to be the best single test yet evolved as an aid to prognosis, and ample proof can now be provided of its value as an indication of activity, of immediate outlook, and of response to treatment, so long as readings are taken at regular intervals over a long enough period. The correlation of the clinical condition on admission and discharge with the sedimentation-rates taken in this fashion, in 100 consecutive positive sputum cases on routine treatment at Midhurst Sanatorium (Trail and Stone 1929) proved that if a normal for both sexes is set at a reading up to 10 per cent. of clear serum in one hour, a good immediate prognosis can be given for those with figures on admission up to 20 per cent. Figures of from 20 per cent. to 30 per cent. warranted a guarded prognosis, as patients in this category seldom attained arrest of the disease within the usual period of sanatorium treatment, while those who gave readings between 30 per cent. and 40 per cent. and over were usually stationary or worse at the end of that time. This same observation showed that the index was superior to the usual "exercise test" on pulse and temperature and led to the following conclusions:

(1) A patient with unilateral disease and a sedimentation-rate beyond 20 per cent. on admission not lessening with a month's absolute rest ought to be seriously considered for collapse therapy.

(2) Bilateral cases with a rate above 30 per cent. similarly not improving are unlikely to be benefited by continued routine sanatorium treatment.

(3) All cases with a falling rate ought to be given a chance of further treatment; and

(4) A regularly repeated sedimentation-rate is a better indication of immediate prognosis than changes in weight, and even than the presence or absence of tubercle bacilli in the sputum.

This last conclusion suggested an after-history investigation, and 500 cases were followed up for 2–6 years after discharge (Trail 1933). The result showed that considerable attention must be paid to the test in assessing ultimate prognosis, as in many cases it was evidently superior to the usual guides of physical signs, temperature, pulse, sputum tests, and fitness for exercise. By such accepted criteria 92 of the 500 were making satisfactory progress as the result of their treatment, yet it was found that their after-history was no different from that of 29 patients who were in the same categories by virtue of their blood tests, but who because of raised temperature had been kept on bed-rest during the whole of their residence. In both groups the ultimate prognosis became increasingly grave with the higher rates of sedimentation. The final deduction was that to enter a sanatorium with a rate of over 20 per cent. and leave with one of over 10 per cent. must warrant a serious outlook, that such seriousness increases with open cases, and particularly those who remain so in spite of treatment, but that nevertheless the rule applies to every case of clinical tuberculosis whether open or closed. Of patients who left the sanatorium with a rate of over 20 per cent., fully 50 per cent. of those who had remained tubercle positive were dead at the end of the period of observation; if they had become tubercle free during treatment, 25 per cent. were dead, while in cases where tubercle bacilli had never been demonstrated in the sputum but who were definitely clinically tuberculous, fully 20 per cent. were dead. On the other hand, it appears to be better to remain positive and to secure a fall in the rate to under 10 per cent. than never to have had positive sputum and leave the sanatorium with a discharge figure of over 10 per cent.

THE MONOCYTE-LYMPHOCYTE RATIO AND THE VON BONSDORFF COUNT

Since the introduction of the sedimentation test, further blood examinations have been studied, particularly the monocyte and lymphocyte ratio. Many workers now believe that this ratio is a definite indication of pathogenesis in that a reciprocal fall in the lymphocytes accompanies a rise in monocytes in progressive disease, while the converse is true in the presence of healing or receding lesions; in other words, that if the absolute number of monocytes approaches that of the lymphocytes so that the comparative ratio is high, prognosis is not good. Their reasoning is founded on the belief that the epithelioid and Langhan's giant-cell of the tubercle are derived from the monocyte in the circulating blood, so that when phthisis is spreading the increasing monocytes in the tissues are reflected in the blood stream at the expense of the lymphocytes, while the opposite takes place when healing commences.

Others have studied the von Bonsdorff count, which is a modification of the Arneth index, and consists in the enumeration of the total number of separate nuclei in the first 100 polymorphs counted; variations in the figure found represent the degree of "shift to the left" which is present.

Many articles have been written showing a superiority for each of these three blood tests over the other two as an index to prognosis, whereas they are essentially in agreement. It only requires a series of counts to be taken in the same patient over a sufficient period of time to prove that variations may occur in one not paralleled by the others. This does not mean that they are necessarily contradictory, as they really demonstrate three different aspects of the same process.

Houghton (1935) has done a considerable amount of work on these lines, and believes that the monocyte-

lymphocyte ratio and the von Bonsdorff count taken together can show pathological changes earlier than the sedimentation-rate. He has sufficient proof to formulate the theory that the differential count indicates potential resistance to the disease, while the sedimentation-rate and the von Bonsdorff count reflect the condition which is the result of the lesion, the former measuring the amount of constitutional disturbance and consequent state of metabolism, and the latter the toxæmia which is the result of the activity. Further he has found it possible to combine all these tests and to reduce them to a common denominator which he calls a "hæmogram," and which can serve not only as a basis of convenient comparison between cases, but also as a fairly accurate sliding-scale of the pathological status of the patient at any given point in his treatment.

Such work gives great hope that in the near future a further research into the use of these combined tests will solve many problems on the indications for treatment and the opportune moment for their employment which still confront the physician. As they already provide an explanation for the longevity of the patient who has gross extent of disease, and for the breakdown within a short period of others who had apparently reached quiescence as judged by other standards, so they give us great assistance in assessing the true pathological status of those still under treatment. We can now prognose that the type of case which is likely to improve most rapidly in its blood picture by the application of collapse therapy is one where there is severe toxæmia, as evidenced by a low von Bonsdorff count, but a good potential resistance and power of fibrosis in a high lymphocyte percentage, while the metabolism and general condition are shown to be able to stand active intervention as there is a low sedimentation-rate.

In the same way changes in the blood picture produced by minor measures warrant a forecast of the probable result of major measures; where an improved von Bonsdorff count and a higher lymphocyte percentage have been attained by phrenic evulsion, still further improvement may be expected from thoracoplasty. On the other hand if deterioration in these tests is shown during the re-expansion of a pneumothorax, it is evidence of the continued activity of the disease and of the necessity of recompression of the lung. It also follows that their use can be very properly extended to the field of after-care.

After-care

We have already seen that the most dangerous year for the sanatorium-treated patient is that following his discharge. There is no guarantee that the same insidiousness will not characterise a re-exacerbation as all too commonly precedes the earliest clinical manifestation of an already established lesion, and present methods of diagnosis of both conditions too often fail to reveal their presence before the extent of involvement is so great that the patient is past the stage of possible arrest from collapse therapy.

Not the least of the advantages to the case of artificial pneumothorax lies in the continual and expert supervision which he automatically receives for a period of some three years following the induction. Frequent screening and film examinations discover complications or fresh foci before the patient is aware of their presence, so that prompt treatment is undertaken. The pronounced effect on ultimate prognosis needs no comment, except in so far as it brings a lesson which we have been slow to learn, in that our after-care schemes in general are withholding from all other ex-patients the benefits conferred on the few fortunate enough to receive active treatment. Until such benefits are universally provided, we must continue with the present results of sanatorium treatment that have shown little alteration since the beginning of this century.

Early Diagnosis

What is true of after-care is true of diagnosis. Of all pulmonary cases treated by the London County Council during 1921, only 35·4 per cent. were diagnosed before the disease had progressed beyond the early stages; a review for the years 1927–31 inclusive shows this proportion to remain practically steady. If this instructive though unpleasant statement is taken in conjunction with the fact that phthisis shows no real improvement in incidence or death-rate over the last thirty years in adolescents and young adults between the ages of 15 and 35, it must follow that the hope for the future lies in diagnosis at a preclinical stage.

From the study of the histories of sanatorium patients it is evident that it is not yet generally realised that a pleural effusion is, in most cases, an infection of the lung periphery by contiguity and extension. Bowditch found that of 90 cases, 32 died of phthisis, and Allard and Koster that of 2123 patients with established lesions, 30 per cent. had a history of previous pleurisy. The records of Midhurst Sanatorium between 1924 and 1933 show an interesting point; of all patients admitted during that period with definite pulmonary diseases, no less than 26·6 per cent. had a history of pleurisy three to four years before admission, but of 61 admitted for pleurisy, only 3, that is, 5 per cent., have since developed any further signs or symptoms of tuberculosis. This is upheld by the findings of Gaarde (1930) who reports that of 68 cases of pleural effusion who had at least four months' rest 43 recovered completely, but that of 17 with less than two months' rest 11 were dead within the same period of observation.

RADIOGRAPHY

The same arguments apply to many cases of hæmoptysis, of long-standing indigestion, amenorrhœa, and fistula-in-ano, for if all such were submitted to screen and film examination by a competent chest radiologist, a large proportion would be found to have latent or even active disease, often established to an alarming extent. That it is already present though unsuspected, and can be diagnosed in the symptomless stage has been demonstrated by the intensive work of Fellowes (1934), Hetherington, McPhedran, Landis, and Opie (1929). Their combined results show a percentage of latent disease of fully 1 per cent. in adolescents, and of 3·6 per cent. at older ages in the apparently healthy. Hetherington discovered 1 per cent. of such foci in adolescent children, and a research at Philadelphia University (1931) showed amongst medical students a continuous increase in incidence in successive years of study of from 4 per cent. in the first year to as much as 21 per cent. in the fourth year. In this country, Wingfield and McPherson (1936) studied 2381 adolescents between the ages of 14 and 21, all of whom were apparently in normal health, and found a positive result in 0·65 per cent., which was increased to 1·08 per cent. when they included abnormal films that could not be explained on any other basis. These facts demonstrate that we have at hand a

method of early diagnosis that can completely alter the prognosis of pulmonary tuberculosis. At present we are spending enormous amounts of money in attempts to patch up those already seriously damaged by a condition which might have been discovered while it was still latent, and on the disasters of relapse and reactivity that present themselves in fully 50 per cent. of treated cases within three years of reaching apparent quiescence. It is almost certain that the expense of the tuberculosis services would be definitely reduced within a period of twenty years if we now began detecting by routine radiography latent disease in adolescents and young adults; what is far more important is that we should certainly have an enormous effect on the prognosis of phthisis, and not only save life, but also alleviate the continuing amount of worry and distress from the ravages of this disease, at the age when we find a sustained morbidity and mortality in spite of all other methods of diagnosis at present employed.

Conclusions

We can now sum up the present position in the light of work done in the past twenty years, and, profiting as much by our failures as by our successes, visualise such application of recent work on earlier diagnosis, the employment of special treatments, and the value of after-care as ought to brighten prognosis very materially in the near future.

The benefits which routine sanatorium treatment can confer are now established by a comparison of the fate of its ex-patients with that of the tuberculous in the general population. The expectation of survival for five years in those so treated can be stated in accordance with their groupings on extent of disease at admission as 80 per cent. in Group I, 66 per cent. in Group II, and 35 per cent. in Group III. We know from statistics of end-results of pneumothorax treatment that such expectation of life has been improved by some 20 per cent. in Group II and Group III cases combined, even though fully 60 per cent. of the recipients were not unilateral cases at the time of induction, and that 40 per cent. of its failures have been given an equal added chance by thoracoplasty despite the fact that this measure has been judged by still harsher standards of selection. Both these methods of active intervention have shown their power to improve on the expected value of routine sanatorium treatment in unilateral cases, which by their very selection were relegated to a category of graver outlook as against their fellow patients of evidently similar extent of lung involvement.

From laboratory tests on peripheral blood we are now able to assess individual resistance, powers of recovery, and toxæmia; to choose the case that is likely to improve on routine treatment and to forecast its length; to select our cases for special treatments, and to state with more exactitude than we could ten years ago immediate and ultimate prognosis. In addition they have shown us why results of sanatorium treatment are practically parallel in many patients of entirely different social standard and therefore of presumably different categories for after-care.

We have yet to apply several lessons of these advances. In view of the static results in routine treatment over the past thirty years, we must aim at conferring on all our patients the benefits of the after-care that have been the foundation of the successes of active treatment, in automatic expert supervision including serial radiography and blood tests; we must become more surgically minded in pulmonary tuberculosis as we have already become more medically minded in surgical tuberculosis, and if we are to have any effect on the unchanging and very gloomy picture of morbidity and mortality in adolescent and early adult life, we must employ X ray diagnosis, or at least institute further research on its value in the discovery of the disease while it is still latent and symptomless.

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THE IMMUNISING POTENCY OF ANTIGENIC COMPONENTS ISOLATED FROM DIFFERENT STRAINS OF *BACT. TYPHOSUM*

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IN an earlier series of papers (Raistrick and Topley 1934, Delafield 1934, Martin 1934) we and our colleagues reported the isolation from *Bacterium typhi-murium* (*Bact. aertrycke*) of a fraction which, on injection into mice, induces an active antibacterial immunity of the same order as that induced by the whole bacterial cells. This fraction is toxic for mice and for rabbits. In addition to increasing the resistance of mice to living virulent bacilli, its injection, in minute amounts, renders them resistant to a few minimal lethal doses of the toxic fraction itself. An antitoxic immunity of this low order has been recorded by many workers who have studied the reactions of the so-called bacterial endotoxins. It is sharply differentiated from the high-grade antitoxic immunity that is readily developed against the so-called exotoxins, such as those of *Corynebacterium diphtheriæ* and *Cl. tetani*, in which an

animal may be rendered resistant to a thousand or more minimal lethal doses. Chemically, this toxic and antigenic component consists of a complex polysaccharide linked to a component containing nitrogen, phosphorus, sulphur, and fatty acids, which is, perhaps, a phosphatide.

Boivin and his colleagues (1933, 1934, 1935, 1936) were independently approaching the same problem by a different method at about the same time as ourselves; and their initial results were published some months before our own. Subsequent studies have made it clear that the component which we have isolated by acetone treatment of the bacterial bodies followed by tryptic digestion and alcohol precipitation is identical, in all its essential properties, with the component isolated by them by extraction with trichloracetic acid followed by alcohol precipitation. Both their studies and our own leave little doubt that this component represents the polysaccharide somatic antigen of the normal smooth form of *Bact. typhi-murium* in its naturally occurring state, and, at the same time, constitutes the main endotoxin. When the complex antigen is heated at 100° C. with decinormal acetic acid it splits into the polysaccharide component, which remains in solution, and the phosphatide component, which is precipitated. The polysaccharide component is entirely non-toxic for mice. The phosphatide component retains some toxicity, but is much less toxic than the complete antigen.

Antigenic components of the same general type may, as Boivin and his colleagues (1933) have shown, be isolated from a variety of organisms, including the members of the typhoid-paratyphoid group. With the exception of the antigen of *Bact. typhi-murium* (*Bact. aertrycke*), and of *Bact. enteritidis* (*Bact. gaertneri*), none of these components have yet been subjected to any detailed study.

The recent investigations of Felix and his colleagues (Felix and Pitt 1934a and b, 1935, Felix, Bhatnagar, and Pitt 1934, Felix and Bhatnagar 1935) on the so-called Vi antigen of *Bact. typhosum*, and the studies of Perry, Findlay, and Bensted (1933, 1934) on the efficacy of various typhoid strains as immunising agents in mice, have raised problems which seemed susceptible to attack along the lines we had followed in our studies on *Bact. typhi-murium*; and the practical importance of obtaining a reliable immunising agent as a prophylactic against human typhoid made it desirable that this possibility should be explored.

The present position in regard to immunisation with whole bacterial cells may be briefly summarised as follows. Felix and his colleagues have shown that certain smooth strains of *Bact. typhosum* are differentiated from many of the ordinary laboratory strains by being very slightly agglutinable in antisera containing agglutinins to the somatic (O) antigen. These O-inagglutinable strains are relatively virulent for mice, while the ordinary O-agglutinable strains are relatively avirulent. The O-inagglutinability of the mouse-virulent strains is determined by the presence of an additional antigenic component—Felix's Vi antigen. This component is relatively heat-labile, and Vi strains subjected to temperatures much over 50° C. become freely agglutinable with an O antiserum. When Vi bacilli, killed in various ways, are injected into mice they induce an effective active immunity against the subsequent injection of living Vi bacilli. Killed vaccines prepared from smooth O strains, however, have been found, by the workers referred to above, to be entirely, or relatively, ineffective in inducing an active immunity. In this case, therefore, it is not sufficient to use a smooth strain containing the ordinary heat-stable smooth somatic antigen. The Vi antigen must also be present. There are certain reported findings which are, at the moment, not easy to reconcile with one another. Thus, living Vi bacilli injected into the rabbit lead to the production of Vi agglutinins which act specifically on the Vi antigen, as well as of O agglutinins. Such antisera promote phagocytosis of Vi bacilli in vitro, and exert a protective action against them in vivo. The injection of formol-killed Vi cultures into rabbits induces the formation of Vi agglutinins; but the antisera so prepared have been found to lack protective power in vivo, and phagocytosis-promoting activity in vitro. The injection into rabbits of Vi bacilli killed by heating at 58° C. has failed to stimulate the production of Vi agglutinins except to a trivial degree, and inconstantly; and such antisera have been found to have no protective power. It has, however, been the experience of Felix himself (see Felix and Pitt 1934b), of Perry, Findlay, and Bensted, and of other workers (see Schütze 1936) that Vi bacilli killed in a variety of ways, including killing by formol and by exposure to moderately high temperatures, are fully effective in the induction in mice of an active immunity to living Vi bacilli. It may be noted that doubts have been raised as to whether the Vi antigen can properly be regarded as determining virulence in the usually accepted sense (see Kauffmann 1935–36, 1936, Ørskov and Kauffmann 1936). There is general agreement that the minimal lethal dose for mice of living Vi bacilli is much smaller than the minimal lethal dose of O bacilli from which the Vi antigen is absent (50–200 million as compared with 1000 to 2000 million); but the M.L.D. of the Vi strains remains relatively high, and almost certainly induces some degree of directly toxic effect. It should also be noted that strains intermediate between the pure Vi form and the pure O form are very frequent, and that the recorded results suggest that the immunising efficacy of any given strain is directly related to its content in Vi antigen.

Experimental

The strains used in these experiments have been a rejuvenated Rawlings strain (R.R.), for which we are indebted to Major-General Marrian Perry of the Royal Army Medical College, and the well-known H901 strain. The R.R. strain is inagglutinable by an O antiserum when tested in the form of a young living broth culture at 37° C. (see Craigie and Brandon 1936). The 901 strain is readily agglutinable. The minimal (average) lethal dose of the R.R. strain for mice weighing 18–22 g., the bacilli being injected intraperitoneally, is rather less than 100 million bacilli. The corresponding dose of the 901 strain is rather more than 1000 million bacilli. The R.R. strain is, therefore, of the Vi type, the 901 strain of the O type, or, more strictly, the H–O type.

From each of these strains we have prepared a purified antigen by the same methods as we employed in our studies on *Bact. typhi-murium*. Full details of these methods, and of the chemical properties of the antigens isolated, will be published elsewhere. For the moment it will suffice to note that the typhoid bacilli are killed by treatment with acetone, and then submitted to full tryptic digestion. The digest, after clearing by centrifugation, is submitted to alcoholic precipitation. The antigenically active fraction is flocculated by 68 per cent. alcohol; and, for this

reason, we have provisionally labelled it F68. This fraction is further purified by repeated alcoholic precipitation, and is then treated with oxalic acid which removes an appreciable amount of calcium which is present. The antigen is further purified by several alcoholic precipitations from acid and neutral solutions. It is with these components (R.R./F68 and 901/F68) that the following experiments have been performed. The yields of purified antigen obtained from the R.R. and 901 strains of *Bact. typhosum* and from *Bact. typhi-murium* were in each case from 15–20 per cent. of the weight of the dry bodies.

Reverting for the moment to the tentative conclusion of Ørskov and Kauffmann, that the relatively high pathogenicity of Vi strains depends on toxicity rather than on virulence, we may note that the F68 antigen from the Vi (R.R.) strain has not, in our hands, proved more toxic than the F68 antigen from the O (901) strain. Indeed, in the few comparative tests we have made, the reverse has been the case.

THE IMMUNISING POTENCY OF R.R./F68

The first experiment was designed to test whether an F68 fraction isolated from a Vi strain of *Bact. typhosum* would induce an active immunity of the same order as that induced by the whole bacterial cells.

The general plan of this experiment, and of those recorded later, has been the same as that followed in all our earlier studies. A number of mice sufficient to allow for a few deaths during immunisation have been injected with two or more doses of the fraction, or fractions, under study, the injections being given at weekly intervals. One week after the last immunising dose, the mice, in batches of 30, have been injected intraperitoneally with living Vi bacilli (strain R.R.) in a dose of 500 million. At the same time we have tested numerically equal batches of non-immunised controls. The standard dose of purified antigen has been 0 017 mg. The dose of bacterial cells, killed by the addition of 0 25 per cent. formol and heating at 55° C. for 1 hour, has been 500 million.

In this experiment three immunising injections were given intraperitoneally. Two groups of mice immunised with each reagent were tested, and two groups of controls. All mice were observed for 7 days after receiving the test dose of living bacilli, though deaths very rarely occurred after the third day.

The results of this experiment are summarised in Table I, and need little comment. Both the whole bacterial cells, and the purified antigen derived from them, induce an effective immunity to living Vi bacilli. The differences between the immunised and and non-immunised groups are well beyond the limits required for statistical significance. There is no significant difference between the degree of immunity induced by the purified antigen and by the whole bacteria.

TABLE I

Showing the relative immunising potency of killed bacterial cells from a Vi strain of Bact. typhosum *(R.R.) and of a purified F68 antigen from the same strain.*

Group No.	Immunising agent.	No. of mice in group.	No. of mice dying.
1	Whole bacteria.	30	1
2	Whole bacteria.	30	1
3	F68.	30	3
4	F68.	30	0
5	Nil (controls).	30	23
6	Nil (controls).	30	25

THE RELATIVE IMMUNISING POTENCY OF THE Vi (R.R.) AND O (901) ANTIGENS

In regard to the immunising potency of whole bacterial cells from the Vi (R.R.) and 901 strains, and of the purified antigens derived from them, our results are not in entire accord with the general conclusions of Felix and his colleagues, since we have found the 901 strain, and the purified antigen derived from it, to possess a significant degree of immunising potency. They are, however, in accord with the actual experimental results reported by Felix and Pitt (1934b), and with the important conclusion of Felix and his colleagues, of Perry, Findlay, and Bensted, and of other workers, that Vi strains of *Bact. typhosum* are much more effective in inducing an active immunity in mice than are mouse-avirulent strains, from which the Vi antigen is absent. The degree of difference observed seems to depend on the route by which the immunising injections are given, and on the number of doses administered.

In all the following experiments a uniform dose of 0·017 mg. of the antigen under test has been employed, or of 500 × 10^6 bacilli killed by formol and heat. The immunising injections have been given at weekly intervals, and a test dose of 500 × 10^6 living Vi (R.R.) bacilli has been given one week after the last immunising dose. The results may conveniently be summarised in tabular form (Tables II. III. and IV).

(*a*) *Two immunising doses given subcutaneously.*—The results are shown in Table II. Under these conditions the killed Vi (R.R.) bacteria, and the F68 antigen derived from them, induce an effective immunity. The O (901) bacteria, and the F68 antigen derived from them, are quite ineffective. These findings, so far as the relative potency of the whole bacterial cells is concerned, confirm those reported by Felix and Pitt (1934b). The purified antigen derived from the R.R. strain appears to be slightly less effective than the whole bacterial cells; but the observed difference is not statistically significant.

TABLE II

Showing the immunising potency of whole bacilli and F68 antigens from a Vi strain (R.R.) and an O strain (901) when two subcutaneous immunising doses were employed.

Group No.	Immunising agent.	No. of mice in group.	No. of mice dying.
1	R.R. whole bacteria.	30	1
2	901 whole bacteria.	30	27
3	R.R./F68.	30	5
4	901/F68.	30	25
5	Nil (controls).	30	27

TABLE III

Showing the immunising potency of whole bacilli and F68 antigens from a Vi strain (R.R.) and an O strain (901) when two intraperitoneal doses were employed.

Group No.	Immunising agent.	No. of mice in group.	No. of mice dying.
1	R.R. whole bacteria.	30	0
2	901 whole bacteria.	30	16
3	R.R./F68.	30	2
4	901/F68.	30	15
5	Nil (controls).	30	27

(*b*) *Two immunising doses given intraperitoneally.*—The results are summarised in Table III. The whole

R.R. bacteria, and the purified antigen derived from them, again induce a highly effective active immunity; but, when two immunising doses are given intraperitoneally instead of subcutaneously, the 901 bacteria, and the purified antigen derived from them, are by no means without effect. The difference between the numbers of mice dying in the control group and in the group immunised with 901 bacilli is 11, and the standard error of this difference is 3·49, giving a ratio of 3·15 : 1. and hence amply fulfilling the criterion of statistical significance. The corresponding difference for the control and 901/F68 groups is 12, and the Difference/S.E. ratio is 3·38 : 1.

There is no evidence of any difference in immunising potency between the whole bacteria and the purified antigens derived from them.

(*c*) ***Three immunising injections given intraperitoneally.***—The results are summarised in Table IV. Under these conditions the whole 901 bacilli, and

TABLE IV

Showing the immunising potency of whole bacilli and F68 antigens from a Vi strain (R.R.) and an O strain (901) when three intraperitoneal injections were employed.

Group No.	Immunising agent.	No. of mice in group.	No. of mice dying.
1	R.R. whole bacteria.	30	0
2	R.R. whole bacteria.	30	0
3	901 whole bacteria.	30	1
4	901 whole bacteria.	30	2
5	R.R./F68.	30	1
6	R.R./F68.	30	2
7	901/F68.	30	3
8	901/F68.	30	5
9	Nil (controls).	30	27
10	Nil (controls).	30	28

the purified antigen derived from them, induce an immunity against living Vi bacilli of approximately the same order as that induced by the R.R. bacilli, or by the R.R. antigen. In each case the immunity induced by the purified antigen is slightly, but insignificantly, less than that induced by the killed bacterial cells.

THE PROTECTIVE PROPERTIES OF R.R./F68 AND 901/F68 ANTISERA

The results obtained with these antisera were somewhat surprising. Rabbits were injected with the fractions in question, receiving 0·1 mg., 0·2 mg., 0·5 mg., and 0·5 mg. per kg. body-weight, of one or other antigen, weekly doses being given intravenously. One week after the fourth immunising injection the rabbits were bled and their sera examined. They showed O-agglutinin titres for *Bact. typhosum* varying from 1 : 640 to 1 : 1280. Most of them failed to agglutinate Vi suspensions of *Bact. typhosum*, or agglutinated them only to very low titre (1 : 10), and incompletely. The serum of one rabbit that had been immunised with R.R./F68, however, gave complete agglutination of a Vi suspension at 1 : 80 and a trace at 1 : 160. Judging from the experience of Felix, Bhatnagar and Pitt (1934), this titre is definitely above the limit of normal Vi agglutinins, and it would seem that we must regard the rabbit in question as having produced Vi antibody in response to the injection of the F68 antigen derived from the Vi (R.R.) strain. This serum, and the serum of a rabbit immunised with the 901 antigen, which showed incomplete agglutination with Vi bacilli at a titre of 1 : 10, were tested for their protective action in mice: 30 mice were given a subcutaneous injection of 0·25 c.cm. of the anti-R.R./F68 serum, 30 were given a similar dose of the anti-901/F68 antiserum, and 30 an injection of normal rabbit serum. Next day these 90 mice, and 30 normal mice that had received no serum, were injected intraperitoneally with 500×10^6 living R.R. bacilli.

The results are shown in Table V. Both antisera exerted a very definite protective action. The normal rabbit serum exerted none. The anti-901/F68 serum

TABLE V

Showing the protective action, against living Vi bacilli, of rabbit antisera prepared against R.R./F68 and 901/F68.

No. of group.	Serum.	No. of mice in group.	No. of mice dying.
1	Anti-R.R./F68.	30	4
2	Anti-901/F68.	30	8
3	Normal serum (control).	30	27
4	No serum (control).	30	28

appears to be slightly less effective than the anti-R.R./F68 antiserum; but the difference is not significant.

THE CHEMICAL PROPERTIES OF THE R.R./F68 AND 901/F68 ANTIGEN

It has been shown above that both the R.R./F68 antigen and the 901/F68 antigen have a definite immunising effect, but that the R.R./F68 antigen is significantly more potent. When mice are immunised by two subcutaneous doses of 0·017 mg., the R.R./F68 antigen remains fully effective, while the 901/F68 antigen is quite ineffective. It is of obvious interest to inquire whether this difference in immunising efficiency is associated with any detectable difference in chemical behaviour or structure. The chemical analysis of these antigenic components is, as yet, in its earliest stages; but it is already clear that the chemical properties of R.R./F68 differ significantly from those of 901/F68, and of the F68 fraction from *Bact. typhi-murium*.

All three antigens are fine white powders which on dispersion in water give rise to opalescent solutions. All contain nitrogen (R.R./F68, 5·2, 5·3, 4·8 per cent. in three different preparations; 901/F68, 4·9, 5·1 per cent.; *Bact. typhi-murium*/F68, 4·3, 4·8, 4·2 per cent.), and all contain ash (R.R./F68, 2·5 per cent.; 901/F68, 4·0 per cent.; *Bact. typhi-murium*/F68, 4·3 per cent.).

0·4 per cent. aqueous solutions of the three antigens give the following reactions:—

(*a*) All of them give a heavy white precipitate with basic lead acetate.

(*b*) None of them gives a precipitate with any of the following reagents: sulphosalicylic acid, trichloracetic acid, Esbach's reagent, magnesia mixture, silver nitrate, the sulphates of nickel, cobalt and cadmium, and the chlorides of barium and mercury (mercuric).

(*c*) Precipitates are given by R.R./F68, but not by either 901/F68 or *Bact. typhi-murium*/F68, with the following reagents: phosphotungstic acid in 5 per cent. H_2SO_4, neutral lead acetate, uranium acetate, mercuric acetate, and aluminium sulphate.

(*d*) All three antigens give positive Millon, Biuret, Ninhydrin, and Molisch reactions but none of them reduce Fehling's solution.

It is obvious from a consideration of the above results that, while the 901/F68 antigen and the *Bact. typhi-murium* F68 antigen are indistinguishable by the chemical tests referred to above, the R.R./F68 antigen differs in many important chemical reactions from the other two. This difference is also clearly

shown by the behaviour of the three antigens on mild hydrolysis. Thus on heating 1 per cent. solutions in N/10 aqueous acetic acid at 100° C. the three opalescent solutions quickly become more opalescent. With *Bact. typhi-murium*/F68 and 901/F68 a precipitate quickly begins to form after five minutes in the first case and after ten minutes in the second, complete flocculation occurring within thirty to ninety minutes with the formation of a clear supernatant liquid of constant optical rotation, and the separation of a white flocculent precipitate. With R.R./F68, however, no obvious flocculation occurs even after heating the acetic acid solution for 12 hours. From each of the three hydrolysis solutions a mixture of polysaccharides is obtained by precipitation with ethyl alcohol, and each of these mixtures contains as one of its constituents a highly dextro-rotatory polysaccharide.

Discussion

These observations, taken as a whole, offer certain suggestions in regard to the possible nature of the Vi antigen, and the factors that determine its immunological behaviour.

It has been found that :—

(*a*) The whole bacterial cells from a Vi strain of *Bact. typhosum*, killed by the addition of formol and heating at 55° C., are a more effective immunising agent in the mouse than the whole bacterial cells derived from an O strain. This difference is relative, not absolute. It is most evident when the immunising injections are given by the subcutaneous route, and when they are not more than two in number. When three injections are given intraperitoneally, the killed O bacilli induce an immunity of the same order as that induced by the killed Vi bacilli.

(*b*) These results are exactly paralleled by purified antigens of the F68 type isolated from the Vi and from the O strain. Our own experience and that of other workers make it extremely probable that these components represent the complex polysaccharide somatic antigens of typhoid or paratyphoid bacilli in their naturally occurring state.

(*c*) Preliminary chemical studies have shown that the F68 antigen isolated from a Vi strain differs in certain of its chemical characters from the F68 antigen isolated from an O strain.

These findings seem to admit of only two hypotheses. Either the Vi antigen is a modified O antigen, or the Vi antigen, though a separate chemical entity, has chemical properties so similar to those of the O antigen that it remains associated with it throughout a long series of chemical fractionations. Of these hypotheses, the first seems inherently the more probable. It would be in no way surprising if the smooth somatic antigen of the typhoid bacillus developed, under certain conditions, relatively labile groupings of an immunologically active kind. There is an obvious analogy in the acetyl-polysaccharide of the Type I pneumococcus described by Avery and Goebel (1933). When fully developed these groupings might dominate the surface of the bacterial cells, so that these become irresponsive to the O agglutinins. If the Vi groupings were partially developed the cells might be flocculable by both Vi and O agglutinins, as we know the intermediate strains to be. When the Vi groupings were very poorly developed, or altogether absent, the cells might be agglutinable only by an O antiserum. The results that we have obtained with the O (901) strain clearly suggest the possibility that, even in this strain, the Vi groupings are not altogether absent.

It would seem to us that this might be adopted as a tentative working hypothesis were it not difficult to reconcile with certain recent findings of Felix and Pitt (1935). These workers have described the isolation of a rough avirulent variant of a particular Vi strain of *Bact. typhosum* which appears to have retained the Vi antigen while losing the smooth somatic antigen of the O type. Of four rough variants of Vi strains described by these workers, two had lost both the O and Vi antigens, one had retained a proportion of both, and one had retained the Vi but had lost the O. To fit these findings into the working hypothesis suggested above it would be necessary to assume that, in this particular variant, the Vi groupings had become relatively stable, or, in some other way, had come so to dominate the behaviour of the O-Vi complex that the O groupings no longer exerted a significant effect ; or, alternatively, to assume that the complex polysaccharide antigen that is present in rough variants shares with the smooth O antigen the capacity for developing Vi groupings. This problem clearly demands further study; but, at the moment, we feel that these observations by Felix and Pitt must be regarded as rendering less probable the working hypothesis that we should have been inclined to adopt on the basis of our own results.

Finally, it appears possible to isolate from suitable strains of *Bact. typhosum* a chemically pure and stable antigen that has the immunising properties of the whole bacterial cells.

These studies, and others in the same general field, are, of necessity, extremely expensive. They involve the growth of relatively enormous masses of pathogenic bacteria, laborious and large-scale chemical manipulations, and the annual expenditure of many thousands of mice in the immunological assay of the various chemical fractions isolated. They have been rendered possible by grants received from many different sources : from the Leverhulme Trust, the Pilgrim Trust, Imperial Chemical Industries, and from a fund raised by Sir Austen Chamberlain, to which many generous private donors have contributed. To all these we would express our thanks. One of us (J. W.) is receiving a research grant from the Medical Research Council, one (S. W. C.) is holding a Grocers' research scholarship, and one (M. S.), while collaborating in this work, was holding a Beit memorial fellowship.

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WALSALL HEALTH SERVICES.—A new infant welfare centre, which cost £2660 to build, has been opened in Pool-street, Walsall. In July a municipal midwifery service is to be established, and fourteen midwives will be appointed to the staff of the health department.

THE IMMUNISING ACTIVITY OF CERTAIN CHEMICAL FRACTIONS ISOLATED FROM HÆMOLYTIC STREPTOCOCCI

BY T. C. STAMP

AND

E. B. HENDRY

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SEVERAL attempts have recently been made by different workers to isolate immunologically active fractions from hæmolytic streptococci. Lancefield (1928, 1933, 1934) has shown that three or more distinct components may be extracted from the bacterial cells by means of HCl at a temperature of 100° C. These substances were found to differ in their chemical nature and in their distribution among hæmolytic streptococci from different sources. One of these components was shown to be a protein specific for each antigenic type as determined by agglutination and cross-protection tests. In some strains, the type-specific substance that was isolated proved to be a polysaccharide. Another component isolated was found to be shared by a number of different types forming definite groups of hæmolytic streptococci. These group-specific substances had the properties of complex polysaccharides. A third component, described as a nucleoprotein, was shown to be less specific, the same antigenic substance being found in streptococci from widely different sources. None of these fractions appeared to be fully antigenic, though all were found to react in vitro to form characteristic precipitates with suitable antisera. Fractions capable of producing antibodies when inoculated into animals have, however, been isolated by other methods. Lancefield was able to isolate a non-specific nucleoprotein substance by extraction of the bacterial cells with saline in the cold. This was found to give rise to antibodies reacting with similar fractions from a wide variety of strains.

Heidelberger and Kendall (1931, 1936) have isolated by extraction with phosphate buffer solutions of different *p*H, various protein fractions, some of which were found to give rise to type- and group-specific antibodies. Up to the present, however, no fractions isolated have been shown to be capable of inducing active immunity when inoculated into animals. The object of the present work has been to investigate the possibility of isolating immunising fractions of this type from different strains of hæmolytic streptococci, with a view to studying their chemical composition.

Experimental

Fractions have been isolated from the dried or fresh living bacterial cells in various ways, and tested for immunising potency by methods similar to those followed by Raistrick and Topley (1934). Groups of mice have been immunised with a standard preparation of dried bacterial cells and with different fractions to be tested over a period of three weeks. The following method of immunisation has been found to give a satisfactory degree of immunity when the standard preparation was employed, and has been adopted as a routine for all fractions. During the first week each mouse received three doses of 0·1 mg. of the fraction to be tested, given intraperitoneally on three successive days, followed by four days' rest. During the second week each dose was raised to 0·2 mg., and to 0·3 mg. during the third week. Each animal received a total of 1·8 mg. Seven days after the last immunising dose, the groups of mice were tested for resistance to infection with the homologous strain, the dose of washed living organisms administered intraperitoneally being sufficient to kill all non-immunised control animals included in each test. The mice have been kept under observation for 28 days, and the potency of each fraction has been compared with that of the standard preparation, by a comparison of the percentage of survivors in each group.

THE FRACTIONATION OF A GROUP C STRAIN

Strain "S34" has been used throughout the earlier part of the work for the preparation of fractions. It had been isolated from bovine mastitis by Stableforth and was found to fall into Group C by Lancefield's group precipitin reaction, resembling the animal strains of that group in fermenting sorbitol and not trehalose. It has been found to be moderately virulent for mice having an average lethal dose of 10,000 organisms as estimated by colony counts. The infecting dose employed has been about 100 average lethal doses, or approximately one million organisms. The material for fractionation has been prepared by growing the strain for 24 hours at 37° C. in Hartley broth to which 0·5 per cent. of glucose had been added, centrifuging the deposit of growth and washing in distilled water. In preparing the standard dried bacterial cells, the washed living cells have been partially extracted with acetone at 37° C. to kill, washed with alcohol and ether and dried off in vacuo over concentrated sulphuric acid. This preparation has been found to be entirely non-

TABLE I

Method of Isolation of HCl-soluble and NH_4OH-soluble Fractions of Strain "S34" (Group C)

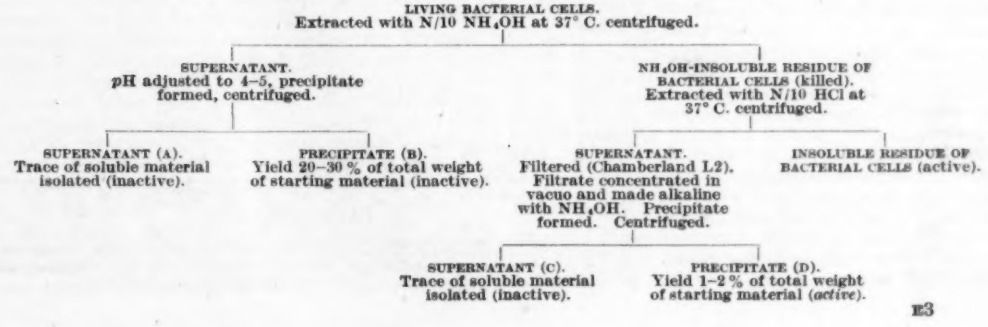
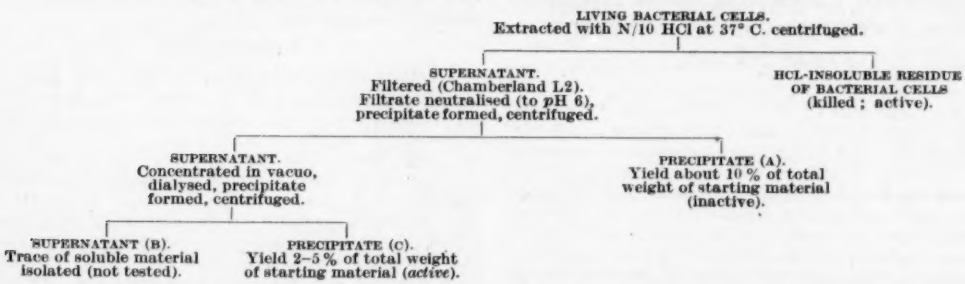

LIVING BACTERIAL CELLS.
Extracted with N/10 NH₄OH at 37° C. centrifuged.
SUPERNATANT.
pH adjusted to 4–5, precipitate formed, centrifuged.
NH₄OH-INSOLUBLE RESIDUE OF BACTERIAL CELLS (killed).
Extracted with N/10 HCl at 37° C. centrifuged.
SUPERNATANT (A).
Trace of soluble material isolated (inactive).
PRECIPITATE (B).
Yield 20–30 % of total weight of starting material (inactive).
SUPERNATANT.
Filtered (Chamberland L2). Filtrate concentrated in vacuo and made alkaline with NH₄OH. Precipitate formed. Centrifuged.
INSOLUBLE RESIDUE OF BACTERIAL CELLS (active).
SUPERNATANT (C).
Trace of soluble material isolated (inactive).
PRECIPITATE (D).
Yield 1–2 % of total weight of starting material (active).

TABLE II

Method of Isolation of HCl-soluble Fractions of Strain "Richards" (Group A)


LIVING BACTERIAL CELLS.
Extracted with N/10 HCl at 37° C. centrifuged.
SUPERNATANT.
Filtered (Chamberland L2).
Filtrate neutralised (to pH 6), precipitate formed, centrifuged.
HCL-INSOLUBLE RESIDUE OF BACTERIAL CELLS (killed; active).
SUPERNATANT.
Concentrated in vacuo, dialysed, precipitate formed, centrifuged.
PRECIPITATE (A).
Yield about 10 % of total weight of starting material (inactive).
SUPERNATANT (B).
Trace of soluble material isolated (not tested).
PRECIPITATE (C).
Yield 2–5 % of total weight of starting material (active).

toxic for mice even when large doses were employed. It was at first used as the starting material for the preparation of fractions, but later it was found that the fresh washed undried cells were more suitable for fractionation. Attempts were at first made to isolate immunising fractions by methods similar to those employed by Raistrick and Topley in the case of *Bact. aertrycke* (1934). It was found, however, that digestion with trypsin completely inactivated the standard preparation. This method therefore had to be abandoned and an attempt was made to isolate an active fraction by extraction with dilute acids and alkalis. The methods which have been employed are outlined in Table I. It will be seen that the freshly grown bacterial cells of strain "S34" have first been extracted with N/10 NH_4OH at 37° C. until no more NH_4OH-soluble material was removed. The extract has then been centrifuged at high speed to get rid of all bacterial debris, and the great bulk of the NH_4OH-soluble material has been found to be precipitated on adjusting the reaction to between *p*H 4–5. This precipitate, called Fraction B, has been washed in absolute alcohol and ether, and dried off in vacuo over concentrated sulphuric acid. The NH_4OH-insoluble residue of bacterial cells has then been extracted completely with N/10 HCl at 37° C. The acid extract after being passed through a bacterial filter (Chamberland L2) has been made alkaline with NH_4OH. A white precipitate formed which was removed by centrifuging, washed and dried off as before. This HCl-soluble-NH_4OH-insoluble material called Fraction D, has been tested together with the NH_4OH-soluble Fraction B. The results of immunisation with these two fractions are shown in Fig. 1.

It will be seen that the HCl-soluble-NH_4OH-insoluble fraction showing 17 survivors out of 25, or 68 per cent., after twenty-eight days, has induced a degree of immunity equal to that produced by the standard preparation, with 15 out of 25 survivors, or 60 per cent.

The NH_4OH-soluble Fraction B, however, has proved completely inactive, all 25 mice immunised with this fraction dying within forty-eight hours. The non-immunised control mice were also all killed within a few days. Further batches of the HCl-soluble-NH_4OH-insoluble fraction have been prepared, and on testing have shown a similar degree of immunising activity. It was found that the active acid-soluble material might also be isolated from the HCl extract by dialysis—the fraction settling out as a bulky precipitate within twelve hours. Fractions prepared by this method did not appear as pure as those obtained by ammonia precipitation, which have the following properties. The active fraction appears to be protein in nature, giving positive biuret and ninhydrin reactions. It contains arginine, tyrosine, and tryptophane and is completely inactivated by tryptic digestion. The Molisch reaction for sugars is negative, but after hydrolysis a small amount (about 6 per cent.) of reducing substance, calculated as glucose, can be detected. The fraction is insoluble in distilled water and ammonia, but dissolves readily in acid to give a water-clear solution. It is precipitated by one-third saturation with ammonium sulphate. It is not coagulated by boiling in very dilute acid. The rotation and total nitrogen content are fairly constant in different batches of the fraction, and neither value was found to change during repeated reprecipitation by ammonia

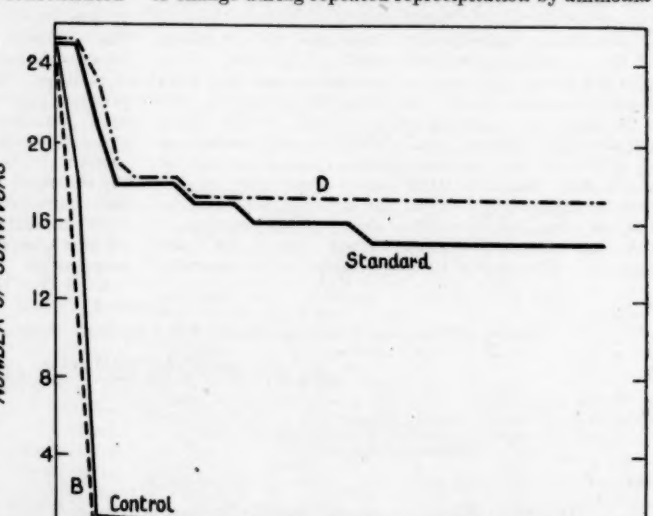


FIG. 1.—Results of immunising mice with a "standard" preparation of dried bacterial cells and with two fractions obtained from the same strain of streptococcus (S34, Group C). The fractions are a NH_4OH-soluble fraction (B) and a HCl-soluble-NH_4OH-insoluble fraction (D). The control mice were not immunised.

from acid solution. The average rotation value was found to be $[\alpha]^{20°}_{5461} = -75°$ in N/10 HCl, and the total nitrogen was 12·8 per cent. The fraction therefore appears, so far as can be ascertained at present, to be practically homogeneous. Since the arginine content is comparatively low (7·2 per cent.) the protein would appear to fall into the histone rather than the protamine group.

THE FRACTIONATION OF A GROUP A STRAIN

Following the isolation of an immunising fraction from a strain belonging to Group C, an attempt was made to isolate a similar fraction by the same methods from a Group A strain "Richards." This had been isolated by Colebrook from a case of puerperal septicæmia and had been passaged through mice until highly virulent; the average lethal dose being approximately 1000 organisms. It has been shown to belong to Griffith's Type 3. The infecting dose employed has been about 100,000 organisms or 100 average lethal doses. This strain was found to yield an HCl-soluble-NH_4OH-insoluble fraction when treated in the same way as "S34." On testing this fraction it was found to be completely inactive. Further tests showed that the activity of the standard preparation was destroyed by treatment with N/10 NH_4OH, but remained unaltered by N/10 HCl. It was therefore decided to extract the living cells directly with N/10 HCl as is shown in Table II. When all acid-soluble material had been removed the extract was passed through a bacterial filter and neutralised, being kept just acid to litmus. A heavy precipitate formed which was removed. This has been called Fraction A. The clear supernatant was concentrated and dialysed to remove inorganic salts. A further precipitate formed called Fraction C. This was also removed by centrifuging. The supernatant after dialysis appeared almost free from organic matter and was discarded. The two precipitates were dried off and tested as before for immunising activity and the results are set out in Fig. 2.

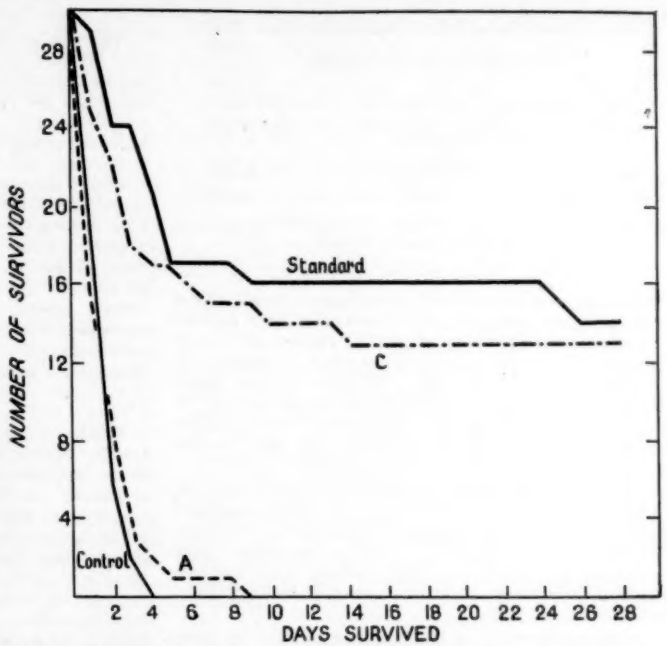


FIG. 2.—Results of immunisation with the standard preparation and with two HCl-soluble fractions of strain Richards (Group A). Fraction A is a precipitate on neutralisation and Fraction C a precipitate on dialysis.

It will be seen that the precipitate forming on dialysis (Fraction C) showing 13 out of 30, or 43·3 per cent., survivors, has produced a degree of immunity equal to that of the standard preparation, with 14 out of 30, or 46·7 per cent., survivors. The precipitate formed on neutralisation of the extract (Fraction A), however, has proved entirely inactive. Further tests with different batches of the active fraction have also produced positive results, though there is considerable evidence that the "Richards" active fraction is much more labile than that from "S34," and rapidly loses its potency on keeping. Attempts are now being made to fractionate this material further, since it almost certainly contains some of the inactive Fraction A. It is not possible to say to what extent the immunity induced by the active fractions of "S34" and "Richards" is specific, since cross-protection tests with these substances have not yet been made. That induced by the unfractionated cells, however, has been shown to be strictly type-specific. It is of interest to note that the antigenic components which induce an active immunity against hæmolytic streptococci belong to a different chemical category from those which induce an active immunity against bacilli of the typhoid-paratyphoid group. This finding is in accord with the results obtained by many other workers who have studied the in-vitro reactions of these bacteria, or of extracts derived from them, and with the view that the components concerned in antibacterial immunity are those that dominate the surface of the bacterial cells in their virulent state.

Summary

(1) Fractions capable of inducing active immunity in mice have been isolated from strains of hæmolytic streptococci belonging to Groups A and C.

(2) The active fraction from the Group C strain is soluble in dilute acids, but insoluble in ammonia and is probably a protein. It appears to be comparatively stable and is not inactivated by ammonia.

(3) The active fraction from the Group A strain resembles that from the Group C strain in being acid-soluble, but is inactivated by NH_4OH and loses its potency more readily on keeping. It also appears to be protein in nature.

Our thanks are due to Dr. A. W. Stableforth who kindly supplied the strain "S34," and to Dr. L. Colebrook for strain "Richards." One of us (E. B. H.) is indebted to the Halley Stewart Trust for a personal grant. The general expenses connected with the investigation have been met by the fund mentioned in the preceding paper.

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DIAGNOSIS AND TREATMENT OF DUODENAL ULCER *

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IF we except arthritis in all its bizarre forms, there is probably no serious disease that can make a patient feel more miserable than duodenal ulcer. It is very trying to be perpetually or periodically conscious of discomfort related to food. If there is also pain, which is common, the sufferer loses his ability to concentrate on his work; conversely worry about his job is in our experience one of the main causes of exacerbations.

In so far as danger is concerned, there are the three major complications, all of which demand surgery—namely, perforation, repeated hæmorrhage, and stenosis from scarring. But in two and a half years we have had only one patient, that we can trace, who has had to submit himself to operation, and then for a stenosis.

Duodenal ulcer is encountered especially in men made tense and irritable by the demands of environment and occupation. One sees, too, sensitive men of middle age. They have been employed all their lives, often in one firm. They see their less efficient fellows laid off, and perhaps they are on short-time themselves. Meanwhile they have been buying on the instalment plan and now for the first time in their lives have financial worries. They lie awake wondering when and how they will be able to make payments on the household articles that are almost their own. Often the weak link of the chain of their health is the digestive system, and it may be that the overactivity of the brain produces abnormal circulatory or spasmodic conditions in the duodenum which rapidly lead on to ulcer. They have no hobbies with which to occupy their spare time. The radio and the movie are their only distraction. They have never done anything constructive. Their work has consisted only in the repeated small operations of a modern industrial plant. They have not done anything to distinguish them among their fellow men. They have never been renowned for growing the best roses in the neighbourhood. They are not distinguished as home "handymen," with the joy of accomplishing good repairing or construction. They neither golf or bowl.

There is another class of patient who is particularly pathetic in that he has had reason to consider himself an efficient machine physically and intellectually. He is the "go-getter," the salesman, who after his day of high pressure selling must make out, and mail to the firm, his daily report—whose sales must each month exceed those of the corresponding month of the preceding year. In this connexion it is interesting to note Cushing's reference to the diencephalon and its relation to ulcer. It is easy to imagine that ulcer may possibly have a determining cause as remote from the site of the lesion as is the brain.

* Read before the Ontario Medical Association on May 31st, 933 (see addendum at end of paper).

SYMPTOMS

The essential symptom, in our experience, is the periodicity of gastro-intestinal distress. If the classical symptom of pain at 2 A.M. is present, the ulcer has been of long standing. We have observed too that bouts of constipation, periodic in character and occurring without any other gastro-intestinal symptom, are of cardinal importance. Indeed, one may say that this symptom points to ulcer unless there are some other signs to make the physician sure there is some other cause for this periodic distress. Many of these patients have "dieted." They have been advised to avoid the rough foods that are known to irritate an ulcer, such as raw apples, radishes, coarse greens, and condiments. Often they will have been told by friends to stop the use of meat and even eggs. The only protein taken then is the utterly inadequate amount found in milk and soups.

TREATMENT

We have found it advisable, at least in the early stages, not to order an X ray examination. Why fix in the patient's mind that he has, or is suspected of having, an ulcer? It is better at first to try the therapeutic test of dieting and to warn him, if relief follows, that he is likely to have an ulcer unless he follows the régime outlined for two years. Early treatment will be successful if it is thorough but it must be followed conscientiously for at least that length of time. We find that the emphasis laid on alkalis is not justified. Years of experience in medical practice have brought no uniformity of opinion as to which alkali is the best, and there is no agreement about the results of their use. They are the least important of the means at our disposal.

Physicians in the past have paid great attention to the details of what the patient should eat but have not advised him enough as to when and how he should eat his food. According to our experience, it is necessary that he should have milk and biscuits often and regularly. We attach the greatest possible importance to his taking half a glass of milk and a biscuit every two hours between rising and bed-time. This applies whether one of the simple meals here outlined has just been taken or not: if, for example, he has drunk his milk and eaten his biscuit at 11 A.M. and at 12 he has had his noonday meal, he should still drink half a glass of milk and eat a biscuit at 1 o'clock. We regard this frequent feeding as of cardinal importance. For breakfast he should have a cereal with milk, soft-boiled or poached eggs, bread and butter, and perhaps a little jam or honey. For dinner, a milk soup, mashed or puréed vegetables, bread and butter, and a milk pudding. For supper, a list like that of breakfast with stewed fruit added to it. He should be told not to smoke, not to take alcohol or condiments. Of these restrictions the avoidance of tobacco in any form is of paramount importance. If progress is good, his diet is enlarged to the three main meals described below, with refreshments between each meal. These extra foods must be taken at least fifteen minutes before the time at which he is habitually conscious of distress. It will be noted that the whole plan is to anticipate and prevent discomfort from, or even consciousness of, his stomach. That is to say, if the distress usually occurs at 4 P.M., milk and biscuit should be taken at 3.45.

It is essential that the patient should have enough time after the midday meal for a rest of an hour. The lathe hand, the professional man, the clerk,

the stenographer, all can take enough time off to take milk and biscuit between meals. If he does not do well on this simple diet, we find it advisable to add an antacid with atropine. A warning is necessary against over-dosage, but atropine is very important.

Constipation is often a major symptom. We advise going to stool regularly at exactly the same time, adopting a proper squatting posture, and exercising counter-pressure with toilet paper between the coccyx and anus. This prevents prolapse (thus making the defæcation easier) and perhaps stimulates the rectum to increased activities by exaggerating the contact pressure between its posterior and anterior walls.

The patient should be instructed that if he does not follow the dietary instructions of frequent feeding for at least two years the ulcer may return. He should also be warned that if he does abandon his diet, the slightest symptom of indigestion should be followed by a prompt return to his régime. Far too often we find patients who have had news from friends of some miraculous alkali that was going to enable them to eat as seldom as they wished.

The patient should come back in two weeks, again after a month's interval, and subsequently, if the progress is satisfactory, every three months for two years. Warning should be given of the symptoms of the major complication of a perforation. Hæmorrhage is certain to be noticed. The physician can assure himself of adequate observance of his orders by directing the patient to write down a typical day's menu. Often it will be found that the light nourishment ordered for mid-morning and afternoon has been omitted. Emphasis should then again be laid upon this essential point. Failure through such omission is not a medical failure. It is the patient's failure to take advice. It is dangerous in the extreme, for it may cause continuance of the ulcer or a recurrence.

Most books and instructions have that quaint phrase "avoid worry." How should one not worry if one is persistently conscious of distress when there should be a feeling of well-being? It is far better to advise the patient constructively as to how he can employ his spare time. There may be twenty ways of remembering, but there is no way of forgetting except by diversion. He should have occupation in leisure hours, not laborious but pleasurable, and if possible showing profits that will distinguish him from his fellows. Gardening, home carpentry, making or doing jig-saw puzzles, or doing cross-word puzzles, or photography will so interest him that he will not worry. Increased mental activity purposelessly applied—that is, worry—makes the ulcer worse.

DAILY RÉGIME

The following is our daily régime for these patients:—

A glass of water slowly and then another.

Breakfast.—Apple sauce, prunes or a ripe banana. Cooked cereal with top milk, and wheat germ. Boiled, poached, or coddled egg. Toast and butter. Tea or coffee with plenty of milk.

Water-closet.—At same time daily. Position and pressure as described above.

10.30 a.m.—Glass of milk or buttermilk and a biscuit.

Dinner.—Strained cream of vegetable soup or milk to drink. No veal or pork, but any roast, boiled, or broiled fish, beef or lamb, potato and another boiled vegetable mashed through a sieve and butter added. Any milk pudding (custard, tapioca, bread pudding, or blanc mange), jelly or stewed fruit, bread and butter.

Rest an hour.

4.30 p.m.—Glass of milk and a biscuit.

Supper.—Cream soup, made with any of the above puréed vegetables or tomato juice or milk. Any cold meat, cheese, fish, or egg dish. Stewed fruit with milk. Toast or dried bread. Milk in tea or coffee.

10 p.m.—Glass of milk. Toast.

Bed at 9.15 five nights a week. No smoking or drinking. Dose of medicine after each meal.

The powder is as follows:—

Atropine sulphate	.. ..	1/25 grain
Calcined magnesia	.. ..	120 grains
Soda bicarbonate	.. ..	120 ,,
Calcium carbonate	.. ..	ad 480 ,,

½-teaspoonful after meals and as required. To be repeated. Watch for atropine intoxication.

ADDENDUM

We have purposely refrained from publishing the above paper for several years, lest its optimism should prove unjustified. We have been more than ever impressed, however, by the success of our efforts. The points that we want to impress at this date are first of all, the need of being hopeful; secondly, the inadvisability of fixing the patient's attention upon a duodenal ulcer (as may be done by X ray examination); thirdly, the necessity for frequent feeding; and fourthly, and most important of all, the importance of diversion if recurrences are to be avoided.

THE USE OF "DORYL" (CARBAMINOYLCHOLINE) IN POST-OPERATIVE AND POST-PARTUM RETENTION OF URINE*

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THE nervous control of the bladder musculature and the processes involved in the act of micturition are extremely complicated and still only in part understood. It is certain, however, that much of the muscular activity of the bladder is under the control of the parasympathetic nervous system.

As the result of the investigations made during recent years by Dale and Loewi and their associates, it is now generally agreed that nerve impulse in the parasympathetic system is transmitted across synapse, and passed from nerve ending to muscle or gland by the momentary liberation of a chemical substance, acetylcholine, which is itself almost instantly destroyed by enzyme action. Acetylcholine can be prepared synthetically, and if administered in an appropriate manner it will reproduce the effects of parasympathetic stimulation. It has therefore been suggested that acetylcholine, or an allied substance, might be effective in promoting micturition in cases of post-operative retention of urine due to atony of the bladder wall or even to reflex spasm of the bladder sphincter.

Since acetylcholine is rapidly destroyed by enzyme action in body fluids, injection of even relatively large doses of this substance cannot be expected to produce more than a fleeting stimulation of the organs controlled by the parasympathetic nervous

* A report to the Therapeutic Trials Committee of the Medical Research Council.

system. On the other hand, certain other choline esters have a pharmacological activity approaching that of acetylcholine while being, at the same time, much more resistant to enzyme action. One of these esters—carbaminoylcholine—has been issued to the medical profession under the trade name of Doryl. Among its suggested therapeutic uses is the treatment of retention of urine, and Schulze[1] has reported successful results in some 75 per cent. of cases in which it was used after operation or after childbirth. The Therapeutic Trials Committee of the Medical Research Council agreed to accept doryl for further clinical trial in this way, and the manufacturers (Messrs. E. Merck of Darmstadt) have kindly supplied it for the purposes of the tests described below.

DOSAGE OF DORYL

Doryl is issued in tablet form for use by mouth, and also in ampoules containing 0·25 mg. of the pure substance (carbaminoylcholine) dissolved in 1 c.cm. of fluid; the solution is intended for hypodermic or intramuscular injection. In a few preliminary experiments oral administration of doryl proved ineffective in promoting micturition, and injection was therefore resorted to. In the cases to be reported a full ampoule was used, and the dose was usually given intramuscularly.

RESULTS IN CASES OF RETENTION OF URINE

In a preliminary series of some 10 cases of post-operative retention of urine, injection of doryl was found to be remarkably successful in causing the patient to void urine within a few minutes, thus avoiding the necessity of catheterisation. After this initial success, detailed records were kept of the effect of the drug in order to provide a report for the Therapeutic Trials Committee, and the present statistics refer to this later series of observations.

The patients were unselected and consecutive cases of retention of urine occurring in the gynæcological and obstetric wards of Hammersmith Hospital (British Postgraduate Medical School). All the cases were those showing evidence of bladder distension of such degree as would, in ordinary circumstances, necessitate the use of a catheter. The total number of cases collected is comparatively small (38), but it is intended that the results should be considered in conjunction with the similar report by Mr. J. S. Maxwell, who tested the drug in the surgical unit of the Western General Hospital, Edinburgh. The case records have been divided into three groups—successes, partial successes, and failures. By a "partial success" is meant that the patient voided urine after administration of doryl, but that subsequent evidence showed the bladder still to be incompletely emptied.

Successes	14	Abdominal section	4
		Colporrhaphy	3
		Curettage	2
		Attempted abortion: self-injury	1
		Post-partum	4
Partial successes	8	Colporrhaphy	1
		Post-partum	7
Failures	16	Colporrhaphy	3
		Bartholin gland excision	1
		Post-partum	12

In most of the cases one dose only of doryl was given, but in 5 the dose was repeated. Thus a patient who had voided urine satisfactorily after administration of doryl later had a recurrence of retention; this was again successfully treated by an injection of the drug. Similarly, 3 patients listed as partial successes had a recurrence of retention and were again given doryl (twice in one case); the results were again partial successes. One patient, who was suffering from over-distension of the bladder, and who had failed to respond to the drug, was not relieved by its repeated administration.

It was found that if doryl was to be effective, the patient usually felt a desire to micturate within 15 minutes of the injection. Sometimes the effect appeared in as short a time as 5 minutes, and for that reason it was found to be important to give the patient a bed-pan immediately after the administration of the drug. It is fairly certain that some of the early failures were due to a lack of appreciation of this fact—the urge to micturate being allowed to subside before the patient was given facilities to void urine.

COMMENTARY

Some of the successes were remarkable, and not infrequently the patient passed flatus or fæces in addition to voiding urine.

It will be seen that most of the failures were in cases of post-partum retention of urine. Some of the patients in this group were suffering from injury to the vulva or perineum following difficult forceps delivery, and the compression of the urethra caused by the subsequent œdema and muscular spasm possibly explains the non-success of the drug. It seems likely, however, that a more common reason for its failure was a delay in the use of the drug until the bladder had become seriously over-distended. It is remarkable how often a puerperal patient has a symptomless yet gross over-distension of the bladder. It is also not uncommon to find that after apparently normal micturition such a patient will have a residual bladder content of 15 oz. or more. In some of the failures with doryl subsequent catheterisation showed that the bladder contained more than 30 oz. of fluid. This over-distension is regrettable, yet it is notorious how often such a condition of the bladder escapes detection during labour and in the puerperium. It is probable that had post-partum retention of urine been detected at an earlier stage the doryl treatment would have been considerably more successful.

As was to be expected, colpoperineorrhaphy caused in some cases a stubborn retention of urine; the mechanical procedures involved in this operation not infrequently produce a compression of the urethra which only catheterisation can overcome.

SIDE-EFFECTS

The pulse-rate was in each case taken before injection and again quarter of an hour after administration of doryl. Usually it was unchanged. Sometimes it was slightly accelerated. In one case it dropped from 84 beats per minute to 60.

In 8 cases the patient complained of nausea or faintness, or admitted to having these symptoms after direct questioning. In one case the faintness was of some severity and led to anxiety on the part of the nursing staff; it lasted for a few minutes only. Another patient who felt nauseated, actually vomited some minutes after the injection. A few patients complained of salivation, and a few stated that they "felt hot all over."

In spite of the variety of possible side-effects, one is left with the impression that injection of doryl in the recommended dosage seldom causes more than a minor disturbance, and in this connexion it must be remembered that there are many sensitive patients who are upset by the procedures involved in any hypodermic injection.

[1] Schulze, E. (1935) *Münch. med. Wschr.* **82**, 1358.

THE POSSIBLE EFFECT OF SUGGESTION

It may be questioned by some whether the successful results recorded in this paper were not in fact due to the effect of suggestion on susceptible patients, and were therefore unconnected with the specific action of the drug in reproducing the effects of parasympathetic stimulation. This criticism cannot be answered dogmatically, but there is reason to believe that suggestion is not the chief reason for the successful result of the treatment. All the patients on whom the drug was used had already resisted the simpler methods usually adopted by the nursing staff to encourage a patient to pass urine. Again, the bladder evacuation usually coincided in time with the appearance of the side-effects in those patients who showed such symptoms. Finally, the fact that a few patients not only micturated under the influence of doryl, but also evacuated a substantial part of the content of the colon and rectum, considerably strengthens the belief that the bladder effect is part of the specific pharmacological action of the drug.

SUMMARY

1. A series of 38 cases is reported in which post-operative or post-partum retention of urine was treated by injection of doryl (carbaminoylcholine).

2. Doryl is often remarkably successful in causing the patient to void urine naturally, and is worthy of trial in patients for whom catheterisation would otherwise be necessary.

3. Its most successful use is after abdominal section or after a simple vaginal operation. It is least successful in patients suffering from over-distension of the bladder—especially after childbirth, and in cases in which there is mechanical obstruction to the passage of urine.

4. One of the chief errors to guard against is the assumption that a patient has completely emptied her bladder by the micturition induced by the drug. Often the evacuation is only partial.

5. Side-effects are seen in about a third of the cases, but are seldom serious.

THE TREATMENT OF POST-OPERATIVE RETENTION OF URINE WITH DORYL *

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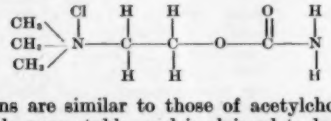
IN recent months all cases of post-operative retention of urine in the surgical wards at the Western General Hospital, Edinburgh, have been treated by injections of Doryl solution.

The makers (Messrs. E. Merck of Darmstadt) state that doryl is carbaminoylcholine chloride, its formula being:—



Its actions are similar to those of acetylcholine, but it is much more stable, and is claimed to be effective even when given by mouth. It is issued as tablets containing 0·002 gramme doryl for oral administration, and as an isotonic solution in ampoules for injection; the dosage suggested for subcutaneous or intramuscular injection is 0·00025 g. doryl which is contained in 1 c.cm. of the solution.

Through its influence on the parasympathetic nervous system, doryl has been shown in pharmacological experiments to cause a decrease in heart-rate, a fall in blood pressure, dilatation of the peripheral blood-vessels, and contraction of the muscle of the bladder and intestinal tract. It is recommended by the manufacturers for the treatment of such diverse conditions as retention of urine, intestinal atony, hyperpiesia, paroxysmal tachycardia, and eclampsia, but the present investigation is concerned only with its action on the bladder muscle. The antidote in cases of overdosage is atropine.

INCIDENCE OF POST-OPERATIVE RETENTION

During the time of the investigation 240 general surgical operations were performed at the hospital. Post-operative retention of urine developed in 17 cases, or 7 per cent. It did not occur in any patient below the age of twenty years; between the ages of twenty and eighty, the incidence was nearly uniform at all ages, but the 14 patients over the age of eighty escaped this symptom. The incidence in men was 7·7 per cent. and in women 6·4 per cent.

Excision of hæmorrhoids was the operation most often followed by retention of urine; next came appendicectomy and other operations within the abdomen. In the 30 patients operated upon for radical cure of inguinal or femoral hernia, there was no instance of post-operative retention of urine.

DOSAGE OF DORYL

If, 24 hours after operation, the patient was acutely distressed and could not pass urine, 1 c.cm. of doryl was injected subcutaneously. This dose was repeated at half-hour intervals until the retention was relieved or until a total of 3 c.cm. had been given. There was, however, no clear indication against reducing the interval between doses or of giving even more than 3 c.cm. (0·00075 g.) subcutaneously. Oral administration was not tried in this experiment.

RESULTS

Of the seventeen patients treated with doryl, eleven responded rapidly and passed urine within 5–25 minutes of the first injection. Four others required three injections each, passing urine within 15–30 minutes of the third dose. The remaining two patients failed to micturate within 30 minutes of the third injection, and might therefore be classed as "failures"; both these, however, were relieved spontaneously within two hours. In the "successful" cases in this series it appeared that doryl caused adequate emptying of the bladder, and in all but two of them micturition thereafter proceeded normally. Two patients had recurrences of retention, one on the second and third days after operation and the other only on the second day; the first of these had had an excision of hæmorrhoids, and the other an intra-abdominal operation; each recurrence of retention responded within 5–20 minutes to a single injection of 1 c.cm. doryl.

Operations liable to interfere mechanically with the urethra had been performed in five of the seventeen cases in this series (excision of hæmorrhoids in four and colpoperineorrhaphy in one); in all five of

* A report to the Therapeutic Trials Committee of the Medical Research Council.

these cases the retention responded to a single injection of 1 c.cm. doryl, though in one, as mentioned above, it recurred on the two subsequent days. Since the use of doryl began, no case in these wards has been catheterised for post-operative retention of urine.

Three cases of acute retention due to prostatic enlargement also responded to doryl, though others failed to do so. It has been tried with success in retention due to periurethral abscess, pneumococcal meningitis, and in a case of severe and chronic atonicity of the bladder and colon in a girl aged 23.

SIDE-EFFECTS

The most common side-effect was sweating. It was never very profuse. A few patients complained of nausea and a feeling of weakness. Sometimes the pulse-rate was not affected, but more frequently there was a decrease of about 10 beats per minute fifteen minutes after injection. The systolic blood pressure also fell, 10–30 mm. Hg fifteen minutes after injection. After one hour the blood pressure again became normal. Flatus was passed in many cases.

CONCLUSIONS

Doryl given by subcutaneous injection is a useful remedy for post-operative retention of urine. The results obtained in this series of cases appear to justify its trial in retention of urine due to any cause other than extreme mechanical obstruction.

I am grateful to Sir David Wilkie, director of the surgical unit, Western General Hospital, Edinburgh, for permission to publish an account of this study. I am also grateful to the manufacturers of doryl, who supplied the material through the Therapeutic Trials Committee.

RIDER'S BONE

REPORT OF A CASE

BY A. MOORE, M.B. Lond.

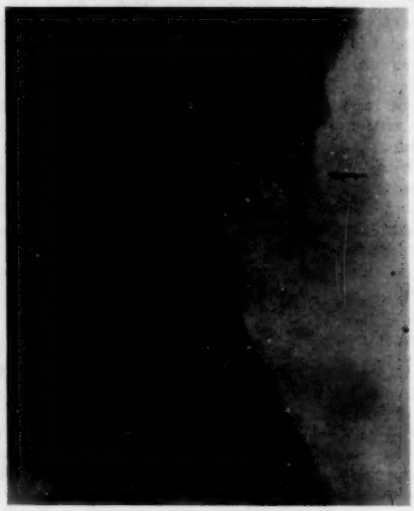
THERE is a tendency to regard the formation of "rider's bone" as a traumatic myositis ossificans.

In the following case it seems likely that the tumour was originally caused by riding strains, for the lesion has the pathological structure of a traction exostosis.

The patient was a man aged 38. Before the war he was a labourer, used to horses but not to hard riding. On joining the army he underwent intensive training and passed out as a rough-riding bombardier. He did not sustain any definite injury during these years of hard riding, and had no trouble until March, 1933. He had returned to labouring work, and while climbing a ladder he felt a sudden pain in his right groin; a loud crack was heard, not only by the patient but by two fellow labourers. He was not incapacitated but felt pain and stiffness during the following week. The same sequence of events occurred again in March, 1934, when he was running across a field, and he felt the pain and stiffness for five days. No further trouble occurred until May 6th, 1936, when he took part in a race. A similar crack was heard, accompanied by sudden pain; on this occasion he was unable to walk, and for the first time medical advice was sought.

Examination revealed considerable limitation of flexion at the hip-joint, and on palpation a bony hard projection was felt between the anterior muscles of the thigh; there was much muscular wasting. Radiography showed a mottled opacity continuous with the ilium, arising from the acetabular region and projecting down as a tongue-shaped process anterior to the right femur (see Figure). It was this tongue-shaped process that was limiting the flexion of the femur, and it was simply to relieve the mechanical difficulty that Mr. W. B. R. Monteith decided to operate, as the patient was at that time completely incapacitated.

The *operation* was not intended to be an attempt at radical cure, but to improve the flexion of the femur and thus enable the man to return to work. During the exploration it was discovered that the reflected head of the rectus femoris was taking origin from the distal extremity of the tumour. As was suggested by the radiogram this originated from the ilium near the acetabulum. The stalactite-like projection was successfully removed, and since the wound healed the hip movements have been almost perfect. Considering that he has been in continuous employment from that time, and that there are no signs of recurrence of disability, the procedure seems justified. If any more radical measures are indicated later, further operation can still be undertaken.



Radiogram showing the stalactite-like tumour at the origin of the rectus femoris.

Histological report: "The tumour is a traumatic osteoma, and has followed the avulsion of a portion of the periosteum due to muscular action. There is subperiosteal hæmorrhage and presently organisation; and on the top of that calcification and ossification. The section shows, of course, more or less irregularly formed bone with considerable vascularity and many wide intertrabecular spaces, along with areas of osteoid tissue."

In discussing the ætiology of ectopic bone the following theories must first be considered:

Embryonic rests were held responsible by Cohnheim. When there is a definite history of muscle strain, injury, and direct relation of tumour to periosteum this theory will hardly suffice, though it may explain cases where bone forms in the body of a muscle.

Aberrant sesamoids are not usually found in the sites common for tumour formation.

Inflammation was considered by Grawitz and Salmon to be important, but there is rarely any sign of inflammatory reaction with pyrexia. When pyrexia follows injury and hæmatoma, bone formation is not invariable.

Metaplasia was regarded as the cause by Reichert and others, the connective tissue of muscles, fascia, tendons, and ligaments being interchangeable and muscle taking on the powers of periosteum. The theory seems very complicated and there is no histological proof.

Hæmatomata have been considered by some as the primary cause of tumour formation, blood corpuscles

forming connective tissue and then bone. Objection may be raised as in the last theory and neither explain cases in which there is a definite relation between tumour and periosteum.

A congenital bone-forming diathesis (Virchow) must be considered seriously, since muscular injury with subsequent hæmatoma formation is not necessarily followed by bone tumours. There must be some constitutional idiosyncrasy.

Periosteal theory, in which either injury to the periosteum, with muscle crushed to pulp, is followed by the escape of osteoblasts into the muscle pulp where bone may form, or muscle-fibres are torn from their origin with periosteal cells or flakes of bone attached, with a similar result.

The animal experiments of Davis and Hunnicutt (1915) are of great interest. The results were briefly as follows:—

1. Pedunculated transplants in muscle never formed bone.

2. Pedunculated flap of periosteum alone never formed bone.

3. Free periosteal flaps or pedunculated flaps with bone fragments attached always led to bone formation.

In other experiments on animals, detachment of individual muscle-fibres from their origin by electrical stimulation has led to intramuscular bone formation from detached periosteum with bone fragments.

Although there was no definite history of injury I suggest that the cause of the tumour was the frequently repeated strains of the rectus femoris at its origin, when the man was forced to take up unaccustomed rough-riding. This sudden violent exercise did not first give a chance for agonistic and antagonistic muscles to become properly balanced, as in more gradual training. As a result of repeated slight muscle strains of the rectus, fragments of periosteum with probably small flakes of bone attached were torn off by muscle-fibres, and the freed osteoblasts formed bone at the site. By repetition of this process a tumour developed with the reflected head of the rectus apparently taking origin from its distal extremity. This gave the appearance of a traction tumour. Should this theory be true, it seems that it is essential for all men embarking on similar unaccustomed violent exercise to have special preliminary training, with exercises designed to develop gradually the particular muscle balance required. It may be that a fair proportion of men possess the bone-forming diathesis of which Virchow wrote.

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Bourne, Lincs.

CLINICAL AND LABORATORY NOTES

DERMATITIS PROBABLY DUE TO MOTOR FUMES

BY ARTHUR WHITFIELD, M.D., F.R.C.P. Lond.

CONSULTING PHYSICIAN TO THE SKIN DEPARTMENT, KING'S COLLEGE HOSPITAL, LONDON

THE following case appears to me to be worth recording on account of the difficulty often experienced in tracing the cause of acute outbreaks of dermatitis of the face. I have not come across such a case either in my own experience or in my reading of that of others.

The patient was a married lady of early middle age who had suffered for many years from urticaria; and according to her statement every doctor who had tried to cure it had always made it worse. All aperients made it worse and aspirin made her "swell up like a balloon." It was also aggravated by oranges but not by grape-fruit. Owing to her unfortunate experience with previous treatment she refused to allow me to attempt to cure her urticaria, which she said she thought was very slowly dying out.

About Christmastime 1934 she drove in a motor-car in the West of England in bleak weather. Next day her trouble began with a "stabbing tickle" at the top of the left eye, and from this it spread until both eyes were sore and swollen and her face scarlet. This she not unnaturally attributed to draught. She consulted a specialist about it and he gave her a pot of scented cream but no prescription. I made a rough examination of this cream; it appeared to me to be of the nature of a vanishing cream and I found that it contained soap. At any rate its effect was disastrous as it inflamed her face badly just as it was beginning to recover. On leaving off the application and using lead and milk lotion the skin resumed its normal appearance.

Later she drove her own car down to see her boy at school, and as it was cold weather she had all the windows up. Two days later her whole face was again swollen and inflamed.

In February, 1935, she consulted me about her face. I realised at once that the case was a difficult one, and was not inclined to accept the draught as a cause, more especially after I had elicited the fact that she had recently stood some time on her doorstep in a cold wind without experiencing any relapse. Noting that the windows of her car had been closed on each occasion which had preceded an attack I wondered whether there could be a possibility of fumes in the car as an exciting cause. I therefore tried to persuade her to drive with the windows wide open—not a pleasant thing to do in cold weather. She was driven by her husband but finding it too cold with the window wide open she closed it all but a crack at the top. Next day she had another attack. She then followed my advice and drove some distance in cold weather and reported "when I have driven the car since I have had the windows right down. I am all over aches and pains but my face is all right."

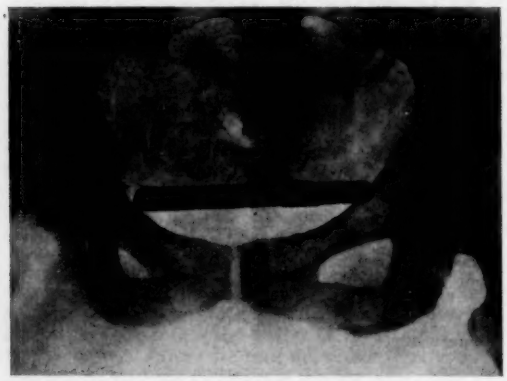
I saw this lady on Jan. 4th this year; she has had no further attacks since the last experiment with the closed car nearly two years ago. Her urticaria which was spontaneously improving when I saw her has disappeared. That her dermatitis was not due to a peculiarity present in one car is proved by the fact that she had the eruption if she drove her other car with the windows closed. The repeated experiment of driving in open and closed cars in cold weather is I think as nearly as possible proof that the eruption was caused by fumes in the closed car. Owing to the extremely small doses which may affect sensitive patients I deemed it impossible to track down the exact constituent that was responsible, but I rather suspect acrolein from partial combustion of the lubricating oil.

When I first saw her I persuaded her to take some glycerin of pepsin and hydrochloric acid with her meals. This had an extremely beneficial effect on her urticaria and may have helped to desensitise her and so assist in the cure of the dermatitis. On this point I should not like to offer a positive opinion.

FOREIGN BODY IN THE BLADDER

By Desborough Brodie, M.B., B.S. Lond.
HON. SURGEON TO THE SHEPTON MALLET DISTRICT HOSPITAL

On June 8th an old lady, aged 78, was doing needlework in bed. She lost a clinical thermometer case containing four bodkins. In getting out of bed to find it, she was conscious that something had entered



Radiogram showing position of thermometer case containing bodkins.

her body. On July 10th, over a month after the occurrence, she consulted me and was radiographed (see Figure). The case could be felt through the anterior wall of the vagina. A suprapubic cystotomy was done and I extracted the case and bodkins. Considering the difficulty so often found in introducing a catheter into the female urethra, this accident must be very rare. There was no sign of cystitis.

ACUTE RETROGRADE JEJUNOGASTRIC INTUSSUSCEPTION

By J. M. Greenwood, M.D. Manch.
DEPUTY MEDICAL SUPERINTENDENT OF THE WITHINGTON HOSPITAL, MANCHESTER

Acute retrograde jejunogastric intussusception was first described in 1917 and less than 40 cases appear to have been recorded since (Adams 1935, Cameron and Macfarlane Pennyfather, Becker 1936). It arises at any time after the operation of posterior gastrojejunostomy and is usually diagnosed primarily either as an acute intestinal obstruction, or a hæmatemesis from a gastric ulcer. According to Maingot (1936), when a hæmatemesis occurs after a gastrojejunostomy, one should always think of intussusception, and further, that in a patient with acute intestinal obstruction a diagnosis of retrograde intussusception should be made if the following three signs are present: (1) an epigastric scar; (2) visible peristalsis with the waves passing from left to right; (3) a palpable mobile swelling about the mid-abdomen.

A male patient, aged 47, was admitted on Dec. 28th, 1936, with a diagnosis of hæmatemesis, possibly from a gastric ulcer. He stated that he had had an operation for duodenal ulcer in 1928, and that he had been free from symptoms from that time, as long as he kept to his diet. He said that he had had some indigestion recently, but denied any excess over Christmas. There was a history of vomiting one pint of blood before admission.

On examination the patient was pale and emaciated, but his pulse was regular and had a rate of 70 per min.; his temperature was 97° F., and his respirations 20 per min. The heart and lungs appeared normal, and the liver and spleen were not felt. A mass was found in the epigastrium, and a provisional diagnosis was made of hæmatemesis from gastric carcinoma or ulcer. Later, on the same day, the patient vomited 18 oz., and again 22 oz. of dark fluid, which was considered to be blood. The pulse-rate shortly after this was 72, and morphine, salines, and heat were administered. On Dec. 29th and 30th melæna stools were present and further attacks of vomiting occurred. His pulse-rate was usually between 70 and 80 but on one occasion rose to 108. A blood count was as follows: red cells, 4,230,000; hæmoglobin, 70 per cent.; colour-index, 0·83. On the morning of Dec. 31st he again vomited more dark fluid but without any increase in pulse-rate, and he said he felt better than on admission. He had a further vomit of fæcal odour later in the day. At this time he had no abdominal pain; he had had a normal stool and had passed flatus shortly before; he had a moist tongue and a pulse-rate of 76. In the abdomen there was an upper right paramedian incision from the previous operation. There was no abdominal distension, but the outline of the stomach could be seen, which on palpation was found to be of elastic consistency, not fixed, and not tender. No peristalsis was visible and there were no glands palpable in the supraclavicular region. Mr. A. H. Southam was asked to see the patient, and operation was decided upon, with the diagnosis of an upper intestinal obstruction.

A general anæsthetic was given, and while in the anæsthetic room the patient passed both fæces and flatus per rectum. A stomach-tube did not relieve the distended stomach.

On opening the abdomen the stomach was found to be enormously distended and the small intestine collapsed, and the condition was recognised as one of retrograde intussusception. The site of the gastro-intestinal anastomosis was examined and the efferent loop of bowel was found to be intussuscepted. The intussusception could not be reduced without opening the stomach; the mucous membrane of the intestine was congested and had a few gangrenous patches on its surface. The intussusception was reduced with difficulty, and the length of bowel invaginated was estimated at 18–24 in. The peritoneal aspect of the gut was good and the gut was considered viable. The stomach and abdomen were closed and a continuous drip saline was instituted, but the patient showed signs of heart failure and died 3 days later on Jan. 2nd.

There seems to be two points of interest in the history: First, a mass in the epigastrium of an emaciated man, aged 47, associated with hæmatemesis, was diagnosed as ? carcinoma of the stomach. It was later diagnosed as a high intestinal obstruction, but if one had been familiar with the description of acute retrograde jejunogastric intussusception, a correct diagnosis might have been made. Secondly, apart from the fæcal odour of the vomit there were no other signs of intestinal obstruction. The pulse-rate at the time of the operation was 76, and fæces and flatus were passed in the anæsthetic room, presumably three days after the onset of the intussusception.

My thanks are due to Dr. M. Gamble, medical superintendent of the Withington Hospital, and to Mr. A. H. Southam for their permission to publish this case.

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MEDICAL SOCIETIES

MEDICAL SOCIETY OF LONDON

AT a meeting of this society held on Jan. 25th, the president, Sir WILLIAM WILLCOX, being in the chair, a discussion on the

Value of Experimental and Laboratory Training in Medical Education

was opened by Dr. JOHN BEATTIE (Conservator of the Hunterian Museum). Laboratory training, he said, was essentially a training in experimental methods, whether they were used in purely scientific work or for obtaining information of value in the diagnosis and treatment of disease. There was no real distinction between it and experimental training except in so far as the latter aimed at the inculcation of what was termed the experimental method, whereas laboratory training was a training in technique and the use of methods. The results obtained from these manipulations were valueless unless those applying the results had a full appreciation of the value and limitations of the scientific or experimental method. The educational value to the medical student of his training in the experimental method was something apart from its factual content. John Hunter said to Jenner, "Do not think, try"; Claude Bernard said, "Think, observe, try, and think"; Thomas Huxley said that the scientific method was trained and organised common sense. It could therefore be summarised as trained observation and trained thinking. Laboratory work trained the student to use methods which ensured accuracy of observation under known conditions. A distinction must be drawn between the intrinsic value of the subject matter of a science, and the educational value of that science. The method he was advocating engendered a healthy distrust of statements made on authority without apparent or provable evidence. In no field was such criticism more needed, and less used, than in medicine.

Medical education now commenced—unfortunately, in Dr. Beattie's view—in our secondary and public schools where chemistry and physics were taught, successfully it might be from the point of view of examination, but often with great damage to education in the experimental method. The deduction of a natural law from observed facts was of much greater value to the student than his knowledge that the volume of a gas varied inversely with its pressure. This brought him to the problem of the teacher. On arriving at a medical school it was very likely that the student did not know how to learn, and even more likely that he did not know how to think. Yet in his first two years he was presented with a cold douche of facts which chilled his enthusiasm, and gave him little chance to think. Too often when told to draw what he saw on a slide under the microscope a student would include something which was not there but which his text-book led him to expect would be there. Good teaching would make sure that careful observation was gradually developing, along with a critical sense. In anatomy schools too often students were lectured to in such a way that curiosity and enquiry were stifled. With the wealth of material in anatomical laboratories it ought to be, and indeed was, possible to lead the student away from considering that the final examination was the ultimate object of his course, and to train him in manipulative technique, accurate observation, and logical deduction.

About the value of a scientific training in medicine there were two diametrically opposed points of view. Oliver Wendell Holmes said that, if a man had not plenty of good common sense, the more science he had the worse it was for his patients. The other view could be summed up by saying that the most important difference between the practical doctor and the truly scientific one was that the patients of the former were more likely to die. In his own view the success of a doctor's education depended entirely on the emphasis which had been laid on the method and spirit of science. The methods of the diagnostician were essentially those used in procuring scientific data: accurate observation and experiment, with logical deduction. The observations were made first by the unaided senses, and then with instruments of precision and various laboratory procedures. From the educational point of view there was no difference between these and the experimental method used by the student in his laboratory unit. The data thus obtained, when properly correlated and analysed according to the rules of the experimental method, led to a conclusion as scientific as those of the investigator in a physiological laboratory. Many clinicians who continually insisted on the value of experience failed to realise in teaching that the medical student should obtain his knowledge for himself. There were profound differences in the training of medical students here and in America. In America the training in the medical sciences aimed specifically at inculcating the scientific method, and ensured that there was no overloading of the student by masses of factual data. The student reached hospital eager and keen to carry on his clinical work in the same spirit. But in the ward the whole atmosphere seemed to have changed, as he seemed not to be trusted to do anything. Too frequently he was not only told to listen to a heart, but also what he would hear. In the English schools the position was reversed; the routine laboratory courses seemed designed to crush out the student's desire to find things out for himself. Minot once said it was a disgrace to a university to appoint a man as professor chiefly because he was a good teacher; only investigators could give university instruction. On reaching the hospital ward the English student had the advantage over the American student that he was made to realise he must obtain his data for himself and draw his own deductions. That being so, the value of the experimental method in teaching could not be denied. To state that the main purpose of medical schools was to turn out efficient practitioners was only another way of stating that they must be expert scientific investigators.

Prof. JOHN RYLE (Cambridge) asked how far time could be allowed in the student's curriculum for the claims of the laboratory sciences. It was profitable to review the relative merits of laboratory and observational or bedside training, especially as the merits might seem to vary with the ultimate destiny of the individual student. Some thought that in this matter a parting of the ways had been reached, and that two curricula might be devised, one for the man who wished to be a practising doctor, the other for the medical scientist, the laboratory worker. It was now customary for medical students to do their preliminary scientific work at school, which meant that from the age of 16 or thereabouts they were specialising in chemistry, physics, and biology. Often unfortunately these were years of cramming rather than of training. The time available and the

requirements of examining bodies also rendered a genuine experimental training impracticable at this stage. The students were given a certain number of facts about crayfish and dogfish, and they learned them to pass examinations; but that was not a proper introduction to the observational or experimental method. For a further three years, in the case of Oxford and Cambridge, they were concerned with anatomy, morbid histology, physiology, and an introduction to biochemistry, and perhaps general pathology. In other words, four years at least were devoted to laboratory studies before there was any contact with a patient or a clinical problem. Though valuable and necessary ground-work was covered, these years involved so much instruction and accumulation of information by book and class and lecture that little time was left for thinking or argument, personal experiment, or a philosophical appraisement of experimental methods. Although improvement had been attempted of late, no concerted effort was made as a rule to bring home the essential unities of physiology and pathology, or the solid contribution which those two subjects could make to the study of man in health and disease.

There was however a larger criticism of this earlier part of the curriculum, and that was that it did nothing to encourage unprompted observation or individual initiative in the perception and solution of naturally occurring problems. A young man blessed with the instincts and hobbies of a naturalist and the important faculty of inquisitiveness might survive this type of training, and even derive new advantage from it; but such young men were exceptional. The majority were decidedly unobservant, and the longer their training as observational scientists (naturalists or clinicians) was postponed the harder they would find it to acquire the necessary aptitude. Moreover, since their scientific education had started early to the exclusion of Latin, literature, and logic, most of them had no compensatory qualities in the shape of humane understanding or powers of language and expression. Among the best and sanest doctors in the world must be included a familiar type of Scotsman—a breed blessed with common sense and generally with a very sound general education. In contrast, it was no rarity to find a student with a distinguished scientific record shaping very poorly in diagnosis, very slow in the development of clinical sense, and very clumsy and irrational in his therapeutic suggestions. Unfortunately his disability tended to make him discontented with, or even contemptuous of, clinical methods. Most good biologists, on the other hand, had been capable both in the observational and the experimental field, and whatever our goal, were we not all students of human biology? The aim surely should be to see how the laboratory approach and the clinical approach to medicine could be planned to run a parallel course. The chief necessity was to keep human physiology in the foreground.

In deciding whether separate curricula for scientist and practitioner were desirable it was necessary to ask whether the present curriculum included less than the scientist required, or more than the practitioner required. Prof. Ryle's own belief was that the honours schools of the older universities and the second M.B. of London provided an adequate standard for the intending scientist, and he was doubtful whether the standard could be lowered for the intending practitioner. For both, however, the actual bulk of the subjects taken could be reduced. A greater selection of subjects should, he thought, be sanctioned within the framework of physiology and anatomy so as to allow of a more intelligent study and lessen the necessity for cramming. With this choice of subject there should be a choice of question in the examination. The average student and intending doctor might for example concentrate more on a group including the cardiovascular system, the digestive tract, and the central nervous system, while the intending biochemist might concentrate on biochemistry, metabolism, and respiration. But how often did a man know at this early stage what he wanted to do later? This was the strongest argument against a bifid curriculum. It was as important for the scientist to receive the broad stimulus of the ward as it was for the clinician to be well grounded in the ancillary sciences. And in the preclinical period nothing stimulated the student so much as a judicious attempt to illustrate his anatomical physiological and pathological studies with clinical material.

DISCUSSION

Prof. GREY TURNER spoke of the need to inculcate the grammar of the scientific method at the outset of the student's career. It was not so much a matter of what was to be learned from the application of scientific methods as how to apply those methods, so that when the student came into contact with the problems he would know better how to approach them. Therefore, even before the student came into contact with patients, he should be made familiar with the best methods for elucidating the problems of disease. Students should learn that research was not necessarily finding out something new, but discovering something for themselves. The scope of the medical curriculum was largely a question of balance; the fact that there were many types of students he thought was mainly due to differences of environment. Too much latitude should not be given to a student's bias.

Dr. R. A. YOUNG would have it realised that medical education was only one aspect of general education. He had always tried himself to inculcate the inquiring, not necessarily the sceptical, attitude of mind. The student should be told that because a statement was made with a certain amount of authority it was not necessarily true; all great advances had been made by questioning what had previously been accepted. He remembered the time when the medical man who wanted to work in a laboratory had to do so by stealth, fearing lest being scientific he would not be sufficiently practical. He would like to see the word "research" in medicine replaced by "investigation." Medicine, as a science, should be looked upon as a branch of biology.

Dr. C. M. WILSON (Dean, St. Mary's Hospital Medical School) suggested that a false antithesis has grown up between the clinician and the man of science. A man of science was not one who used certain instruments in certain places; the paraphernalia of a laboratory were devices to make observations easier and more accurate than they would be if we depended on our unaided senses. But we did not become scientists by using instruments to sharpen observation; it was a man's mental processes that made him a scientist. Such a man was committed by the way he was made and by his training to a critical scrutiny of facts. He was cautious and guarded, he had put aside prejudices and preconceptions. It was this attitude of mind which it was the first duty of a medical school to foster. Laboratory training helped us to this end because it was primarily a place where tentative hypotheses were put to the test. A man working in a laboratory soon became conscious of the superiority of a statement that

could be proved or had been proved over one that he had to take on the authority of his teacher. He was initiated into the nature of evidence and nothing in the practice of our calling was quite so important to him as that.

Lieut.-Colonel A. H. PROCTOR (Dean, British Postgraduate Medical School) felt that the medical student of to-day got very little training in the experimental method. He was usually given the explanation long before he started doing the experiment himself; he was not told what was the problem he was faced with, nor how to think about it. Provided the student had the right teachers his clinical work might start earlier than at present.

Dr. JOHN FREEMAN contended that pure science was not the aggregation of data but an attitude of mind; scientific education was education in a state of mind. Students destined for general practice were filled up with many facts they were never likely to need. Yet he did not know how examiners were to be prevented from asking foolish questions.

Dr. G. W. GOODHART stated his objection to having two separate curricula according to the kind of work the student wished ultimately to follow. When he entered upon laboratory work himself he was given to understand that he must give up any idea of clinical medicine, otherwise he could not claim to be a pathologist. He lamented the fact that so few students knew how to use a clinical laboratory.

Dr. LIONEL WHITBY insisted that every doctor must have a fundamental basis of fact before he could attempt to work as an experimentalist. Some thought the student had too much laboratory training and too little chance of observation in the wards, but just as the pace of an army was that of the slowest soldier so the teaching of a class had to be regulated by the capacity of the dullest.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY

AT a recent meeting of this society, held in Liverpool, with Dr. RUTH NICHOLSON, the president, in the chair, a paper on

Ruptured Uterus

was read by Dr. D. C. RACKER (Manchester), who described three cases treated at St. Mary's Hospital, Manchester, by supravaginal hysterectomy combined with blood transfusion and gum-saline infusion by continuous drip. In one case the patient had been in the hospital since just before labour began; the diagnosis was made immediately after rupture, and Dr. Racker at once performed hysterectomy. In the two other cases the uterus had ruptured before admission, and one patient was almost moribund on arrival after a long journey. In none of the three had there been a previous Cæsarean section, but all had had difficult deliveries previously. Two of the patients recovered completely, but the third, who had been so ill on admission, died eight hours after operation. The anæsthetic used was nitrous oxide and oxygen in one case, morphia and local (Novutox) in another, and ether in the third.

It appeared, said Dr. Racker, that rupture of the uterus was becoming not less but more common than it was thirty years ago. The increase could not be attributed to the greater frequency of Cæsarean section, for the figures for rupture through an apparently normal uterus were not diminishing. In these cases, he thought, there had probably been some previous trauma to the uterus, even a partial or incomplete tear which had passed unnoticed, and he therefore emphasised the importance of a thorough intra-uterine examination after all difficult instrumental or manipulative deliveries. In treatment he felt sure that the method of choice was supravaginal hysterectomy, except possibly in cases with small incomplete tears. Where a Cæsarean scar had ruptured it might be best to quickly suture the torn edges; but sterilisation must follow later, for no patient who had had a ruptured uterus should be allowed to become pregnant again. Treatment per vaginam had no place whatever, apart from small incomplete tears, and intra-uterine tamponage had always given extremely poor results. If the presenting part was low, the temptation was to extract the child and operate later, but this temptation should be resisted, for the extraction might increase the hæmorrhage alarmingly, bring down intestine or other viscera, enlarge the tear, and greatly lengthen the time before operation could be carried out. Formerly rupture of the uterus was nearly always fatal, but with the introduction of hysterectomy in its treatment, about 1900, the fatality-rate suddenly decreased. Even now however it was still alarmingly high, about 25–40 per cent. in various clinics. The prognosis depended on the interval between the accident and operation, and on the amount of bleeding—i.e., whether the placental side had suffered, or a large vessel had been torn. Provided there were no vaginal manipulations, the bleeding was often surprisingly slight, even where the fœtus was lying free in the abdominal cavity. A third factor—perhaps the most important—was sepsis. Most patients had a somewhat stormy convalescence, but with suitable treatment they should be discharged in a healthy condition.

Mr. A. A. GEMMELL described a case he had lately attended in which a woman was admitted to hospital after "failed forceps," and it was found necessary to perform Cæsarean section. After removal of the child a vertical tear was found in the posterior wall of the uterus. This was sutured and the patient recovered.

Dr. RHODA ADAMSON (Leeds) maintained that trauma at a previous confinement was not a necessary ætiological factor. She recalled a case of an 8-para who had had easy confinements yet ruptured her uterus during the first stage of labour, as a result of turning suddenly from her back on to her side. She died within ten minutes, and post mortem a large uterine tear was found.—Dr. J. W. BRIDE (Manchester) referred to a case of rupture in which the uterus was infantile in type.—Dr. E. A. GERRARD (Manchester) supported Dr. Racker's contention that previous trauma is an important cause. He pointed out that spontaneous rupture in a primigravida is rare.

Obstructed Labour

Mr. T. N. A. JEFFCOATE (Liverpool) reported the case of a woman, aged 26, who was first seen at the 36th week of her sixth pregnancy. She had had one previous abortion and four previous labours; of the latter the first three had been normal, but the fourth, in 1932, was difficult and necessitated forceps delivery.

When she was first seen her general health appeared excellent, but on routine antenatal examination a cystic swelling was found behind and slightly to the left of the uterus. Its exact limits and size were hard to define, but there seemed to be no doubt that it was an ovarian cyst which was below the presenting head and almost certain to obstruct labour. The previous history of labours increasing in difficulty supported the diagnosis.

She was admitted to hospital and allowed to go into labour spontaneously on June 30th, 1934. After she had been in labour eight hours, the cervix was two fingers' dilated, the membranes had ruptured, and the head was high above the cystic swelling. Lower segment Cæsarean section was performed under general anæsthesia, and a living female child weighing 7 lb. 4 oz. was delivered. When the uterus had been sutured the pelvis and abdomen were explored, and the operator was horrified to find no tumour. The uterus, in fact, was unicornuate and there was no appendage on the left side. A little thickening beside the pelvic colon was noted, but nothing to account for obstructed labour. The placenta had been situated rather low down on the left wall of the uterus, and it was concluded that the sensation of a cystic swelling must have been produced either by the placenta or by a sacculation of the malformed uterus. The puerperium was uneventful except for mild pyelitis associated with a slight rise of temperature on the fourth to ninth days. This responded quickly to treatment with alkalis. Careful bimanual examination a month after operation revealed no abnormal physical signs, and Mr. Jeffcoate failed to excuse himself on any grounds for what he thought to be a gross error in diagnosis.

The patient was next seen in October, 1935, when she was pregnant again (last menstrual period May 19th). The uterus was enlarged to the size of an eighteen weeks' pregnancy, and no unusual physical signs could be found on vaginal examination. However, she was observed closely and with great interest, and examined repeatedly. At the 30th to 32nd week of pregnancy the "tumour" again made its appearance, and it became more obvious as pregnancy advanced. The case was discussed with a number of colleagues, and they one and all agreed that the correct treatment was to institute trial labour again; but they were unable to suggest the pathological nature of the condition. At the 35th week the presenting head was high, and pus and albumin appeared in the urine. This onset of urinary infection was not surprising in view of her previous attack of pyelitis in the puerperium and the well-known likelihood of its recurrence. She was admitted to hospital for treatment but was fairly well except for occasional headache, a slight rise in blood pressure (150/80), and a little œdema. She received treatment with urinary antiseptics, low-protein diet, &c., but the albuminuria and pyuria persisted to some extent until the onset of labour.

Labour began on March 14th, 1936, and after twelve hours the cervix was three fingers' dilated and drawn up, the membranes having ruptured; the presenting head was above a very obvious cystic swelling. The patient's temperature then suddenly rose to 100·6° F., and her pulse-rate became rapid (118). Dr. A. A. Gemmell saw the patient at this time, and agreed that Cæsarean section must be done.

A lower-segment operation was performed under spinal anæsthesia. However, instead of opening the uterus before exploring the pelvis—as on the first occasion—a hand was passed down to the left of the head, and a very obvious retroperitoneal tumour was discovered about the size of a Jaffa orange. A living male child (6 lb. 2 oz.) was delivered by the usual technique, and, having sutured the uterus, the operator proceeded to investigate the tumour more fully. To his surprise it had once again disappeared. However, on very careful palpation an indefinite soft mass—partly fluctuant—was discovered running down beside the pelvic colon. He realised the risk of hæmorrhage in attempting to deal with pelvic tumours at the time of Cæsarean section, but in view of the temperature decided that further exploration was necessary. There was no true broad ligament on the left side, but the peritoneum was incised and dissection carried out by finger only. When the tumour was reached it was easily separated from its connexions. Just before its removal was complete it burst and very offensive yellowish fluid escaped. Care was taken to avoid clamping or cutting, since it was obvious the ureter must be very close. At one stage a strand of tissue appeared, and in view of the possibility of its being the ureter, it was examined closely between two fingers; during this process it broke, and the surgeon became quite certain that it could not be the ureter, which is usually resistant. At no time was a single vessel of any size seen nor was any bleeding-point ligated.

The tumour having been removed there was now a cavity extending retroperitoneally down to within two inches of the perineum. This repeatedly filled with blood which oozed from all sides. No attempt to find bleeding-points was made, but the cavity was at once packed with ten yards of 12-inch gauze. The abdomen was closed with tube drainage, and the patient left the theatre in good condition. Convalescence was a little stormy, and the patient suffered from some distension. The chief difficulty was the removal of the gauze, which had two knots in it, but it was gradually taken out within 48 hours—gas-and-air analgesia being used for the removal of each portion. The wound broke down partly, but the lochia remained inoffensive. The temperature was never higher than 101·5° F., and by the 18th day the wound was almost healed, the temperature and pulse-rate were normal, and the patient feeling well. She was discharged from hospital on the 40th day.

Before the tumour was opened it was fixed in formalin. It was examined carefully 48 hours after operation, and turned out to be a kidney. All renal tissue had been destroyed, and it had been converted into a pyonephrosis; however, its shape and histological appearance made the diagnosis certain. The strand of tissue which broke was, in reality, an atrophied ureter. In view of the diagnosis a self-retaining catheter was kept in the bladder for a week but there was never any discharge of urine from the abdominal wound.

The solution of the mystery was now clear. This true pelvic kidney was small enough to allow spontaneous parturition until it became hydronephrotic. At the time of the first Cæsarean section the hydronephrosis collapsed during the delivery of the fœtal head—and the cyst, therefore, seemed to disappear. By the time of the second Cæsarean section a pyonephrosis had formed; even then it partially collapsed during delivery of the head, and if the tumour had not been investigated before incision of the uterus it might have escaped notice for a second time.

Prof. HENRY BRIGGS said that an interesting feature of the case was the association of pelvic kidney and unicornuate uterus; the pelvic kidney being on the side of the missing horn.—Prof. MILES PHILLIPS (Sheffield) had encountered two similar cases, in one of which the hydronephrotic kidney had been pushed up and labour had been completed by natural forces. The other had been treated by Cæsarean section.

The PRESIDENT gave an address on Midwifery Customs, Past and Present.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—A special course in preparation for the F.R.C.S. (primary) examination will be given at the Infants Hospital, Vincent-square, S.W., on Mondays, Wednesdays, and Fridays, from Feb. 22nd to May 24th. Dr. Michael Kremer will take the physiology class at 5.15 P.M., and Mr. David Levi will take the anatomy class at 6.30 P.M. An intensive course in gynæcology will be given at the Chelsea Hospital for Women from Feb. 8th to 20th, while a course in medicine, surgery, and gynæcology will be given at the Royal Waterloo Hospital from Feb. 22nd to March 6th. A week-end course in children's diseases will be given at the Princess Elizabeth of York Hospital on Feb. 20th and 21st. Clinical and pathological courses for M.R.C.P. candidates will be held at the National Temperance Hospital on Tuesdays and Thursdays, at 8 P.M., Feb. 16th to March 4th. There will also be courses in chest diseases at the Brompton Hospital (5 P.M., twice weekly, Feb. 22nd to March 20th); in heart and lung diseases, Royal Chest Hospital (on Mondays, Wednesdays, and Fridays, at 8 P.M., March 1st to 20th); in neurology at the West End Hospital for Nervous Diseases (every afternoon, March 8th to 20th).

REVIEWS AND NOTICES OF BOOKS

Surgical Note-taking

Second edition. By CHARLES F. M. SAINT, C.B.E., M.D., M.S., F.R.C.S. Eng., Professor of Surgery, University of Cape Town. London: H. K. Lewis and Co., Ltd. 1937. Pp. 91. 3s.

THE ability to write concise and pertinent notes on clinical cases is a fair criterion of a sound surgical training. Such an accomplishment is attained mainly by working out an original system of note-taking from individual experience; but systems devised by others may be useful, either by providing a standard of comparison and a fund from which to draw ideas, or (less desirably) by being adopted in toto. Mr. Saint offers, to surgical dressers and clerks commencing clinical studies, a system which may be used in any of these ways according to taste. After some observations on surgical dressing he briefly discusses the taking of notes in general, and then elaborates a series of schemes for taking notes on various types of cases, such as injuries, appendicitis, diseases of the tongue, each illustrated by an example. The schemes on the whole are clear and complete; they contain many useful points, but some are, perhaps, too detailed. Those for abdominal emergencies and fractures are the best. There are one or two omissions of some importance: in the case of head injuries no place is given to the taking of a statement by an eye witness; and in the article on jaundice there is no mention of the urine.

The book should be of value not only to the beginners for whom it is written but also to those about to take their qualifying examinations, who will find in it a quick and convenient way to remind themselves of the points to be kept before them when examining their clinical cases.

Elementary Pathology

An Introduction to the Process of Disease. By KEITH S. THOMPSON, Pathologist, Selly Oak Hospital, Birmingham; formerly Lecturer in the Department of Pathology, University of Birmingham, and Pathologist, Queen's Hospital, Birmingham. London: H. K. Lewis and Co., Ltd. 1936. Pp. 74. 10s. 6d.

IN the course of teaching Dr. Thompson has realised that the conventional system of note-taking during lectures leaves much to be desired. The notes taken are frequently incomplete, and sometimes even inaccurate, whilst the time devoted to writing would often have been much better employed simply listening to the lecture. Yet notes or their equivalent cannot be entirely abandoned. The student in his fourth year is faced with a subject which is entirely new to him and of which he does not even understand the elementary nomenclature; he feels the need of notes, even if it is little more than a dictionary of terms. Realising this difficulty Dr. Thompson has endeavoured to overcome it by producing a book which is virtually an ideal set of notes. It is interleaved with blank pages for further points or illustrative examples. In its lay-out the book covers the field of general pathology in a conventional manner and it could be easily adapted to meet any ordinary course of pathological lectures.

The thirty-two figures with which the book is illustrated deserve mention. They mostly consist of full quarto pages showing a large field under low magnification. This method gives the reader an excellent idea of the general architecture of the lesion. The reproduction too is excellent, but in one or two cases the choice of subject might have been better—e.g., to illustrate nutritional diseases of bone by rickets rather than by scurvy. In the text there is a tendency to sacrifice strict accuracy to simplicity of expression. This is seen in such statements as "macrophages do not touch bacteria" or that benign tumours are "of normal structure but overgrown." The processes of inflammation are considered too much as a conscious effort on the part of the body. These are minor points which do not seriously detract from the value of the volume as an introduction.

History of Chinese Medicine

Second edition. By Dr. K. C. WONG, late Lecturer on Medical History, National Central University; and Dr. WU LIEN-TEH, M.D. Camb., Director, National Quarantine Service. National Quarantine Service, Shanghai. 1936. Pp. 906. £1 10s.

THE first edition of this voluminous book was reviewed at length in our columns on its appearance four years ago (vide THE LANCET, 1932, **2**, 1337), and the general scheme remains the same, but the contents have been subjected to close revision. This has been a heavy task, as the whole range of Chinese medical history is covered by the indefatigable authors—i.e., a period of over 4500 years.

The new edition, like its predecessor, is divided into two parts: for the first, which is mainly historical, Dr. Chimin Wong is responsible, while the second part is from the pen of Dr. Wu Lien-Teh. The first part is divided into a "legendary period" (2697–1122 B.C.), a "historical golden period" (1120–960), and a "mediæval period" covering the next 1000 years. This section has been largely rewritten as well as expanded, the interesting chapters on the decline of native practice and on the struggle between the new and old forces being entirely new. Such authentic records as are extant concerning Chinese medicine were studied and collated for the production of the original issue, and apart from some weeding out we have them again in this edition, but the elaborate nature of Dr. Wong's studies is easier to follow now that the evolution and development of the indigenous art is described in fuller shape. But in the second part, which treats of the introduction and progress of modern medicine, we have a complete revision of the previous material, whilst the events of the last eight years are described in a separate section, recording the consolidation of medical work under Government auspices.

Dr. Lien-Teh depicts the salient features of progress introduced by the early Catholic missionaries, and finds that developments throughout the seventeenth and eighteenth centuries were largely due to their influence. He then, in considerable detail, deals with the later work of the Protestant missionaries in the nineteenth century, and shows how, towards the end of the Manchurian dynasty, a gradual adoption of European methods became systematised. A full chronological table affixed to the second part enables us to ascertain at a glance the practical directions in which advances have been made, and indicates the trying conditions under which progress has had to take place. For example, in an attack by the

Japanese Army by aerial and naval forces upon districts near Shanghai, there resulted the destruction of many medical institutions and the killing and wounding of thousands of civilians. Excellent relief work was started by foreign medical institutions, and new hospitals were opened to deal with the situation. Then came the widespread cholera epidemic which marked the end of 1932, while in that year and in the following year there were epidemics of cholera and small-pox, and finally, serious outbreaks of plague in several districts. These disastrous occurrences, according to Dr. Lien-Teh, caused no set-back to medical activities, but, on the contrary, they stimulated the Chinese to greater exertions, and the record of recent work up till the present day is one of great performance. A national bureau for the control of narcotic drugs has been established, hospitals for drug addicts have been started, a midwifery school has been opened at Hankow, and similar schools have been established at other centres, a national quarantine service has taken over the Canton and Swatow stations—and many other examples of practical progress in the last three years might be cited.

Dr. Wu Lien-Teh and Dr. Wong deserve the highest credit for bringing the story of medicine in China up to date; it has been a task requiring great industry and discrimination, and the result of their labours should be of real value to their country by enhancing its scientific position.

Manual of Practical Anatomy

By THOMAS WALMSLEY, Professor of Anatomy in the Queen's University of Belfast. Part III.: the Head and Neck. London: Longmans, Green and Co., Ltd. 1936. Pp. 357. 12*s*. 6*d*.

THIS is a new edition of the third part of a manual which made its appearance some fourteen years ago, and had a second issue ten years later. The present edition shows an increase in size resulting from the introduction of "fuller descriptions of the examination of the living body and stressing the parts which are important in clinical practice." This attempt on the part of the author to meet some of the criticism of anatomical teaching to medical students is praiseworthy, and he is to be complimented on the way in which he has carried out his intentions. It is his bad fortune that he cannot correct the clinical ignorance which is at the bottom of much of the criticism. This issue is a worthy successor and companion to those parts which have already appeared and have established their position among the practical manuals of anatomy.

Recreational Therapy for the Mentally Ill

By JOHN EISELE DAVIS, B.A., M.A., in collaboration with WILLIAM RUSH DUNTON, Jr., M.D. London: William Heinemann Ltd. 1936. Pp. 206. 15*s*.

THE aim of this valuable work is to offer a systematic basis and procedure for forms of treatment that are now often neglected or used haphazard. The competence of the authors is beyond question—one a physician foremost in this field, the other a physical director at Perry Point, Maryland, with an unrivalled experience acquired in the treatment of ex-Service "veterans." The untiring therapeutic effort which is characteristic of American psychiatry is very plain in this practical handbook; theory is expounded in it too, but for the most part the book is concerned with the actual procedures and working problems. There could scarcely be a better corrective for the belief that apart from psychotherapy there is no active treatment for mental disorder. The authors define recreational therapy as any free, voluntary, and expressive activity, whether motor, sensory, or mental, which is vitalised by the expansive play spirit, sustained by deep-rooted pleasurable attitudes and evoked by wholesome emotional release; it is prescribed by the physician, to whom the trained recreational and occupational therapists are technical assistants and advisers. In the discussion of general principles and classification, as well as in the description of actual treatment, tests, objectives, and schedules for training personnel, the authors avoid the temptation to elaborate or digress so that readers who make allowance for the novelty of the subject, and the somewhat different conditions in the United States from those prevailing here, will find this work very serviceable.

Manual of Blood Morphology

By LYDIA SCHUDEL. Leipzig: Georg Thieme. 1936. Pp. 45. R.M.6.80.

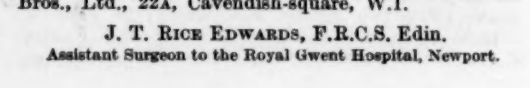
THE writer of this little manual is senior technician in Prof. Naegeli's laboratory at Zurich. The technique of making platelet counts, of making coverslip preparations, and of staining them by the May-Grünwald technique is described. There are thirteen good colour plates illustrating the development of the blood-cells and the characteristic picture found in different blood disorders. No reference is made to any view concerning blood-cell origins except that taught by Prof. Naegeli, which is by no means universally accepted. The letterpress is in German, English, and French. The book has value for the hæmatologist, but is perhaps over-dogmatic for the student.

NEW INVENTIONS

A NEW INSTRUMENT FOR DRAINING QUINSIES

I HAVE used on numerous occasions the following method of draining quinsies with a syringe and an adjustable guarded needle. I have found it simple, practically painless, and much less alarming to the patient than the usual incision with a guarded scalpel, and it gives immediate relief.

The needle is of stainless steel, 4½ in. long and 1·6 mm. in diameter, with an adjustable guard. The



needle can be fixed to an ordinary Record syringe; I prefer to use a 2 c.cm. syringe with ring-grips similar to the one used for hæmorrhoid injection.

The patient is placed in a sitting position in a good light and the needle is inserted into the most dependant part of the abscess to aspirate the pus.

The needle was made for me by Messrs. Down Bros., Ltd., 22A, Cavendish-square, W.1.

J. T. RICE EDWARDS, F.R.C.S. Edin.
Assistant Surgeon to the Royal Gwent Hospital, Newport.

THE LANCET

LONDON: SATURDAY, JANUARY 30, 1937

RHEUMATOID ARTHRITIS: A MOVE ON

IN an address to the Institute of Hygiene last spring Dr. FORTESCUE FOX recalled his experience when he left a house appointment at the London Hospital for a rheumatic spa in the north of Scotland and was astonished to find that many of the victims of arthritis were young women and girls. As parish medical officer he was soon led to associate this painful and terribly crippling disease with residence in ill-lighted crofters' cottages and bothies. It was actually twenty-five years earlier than this that ALFRED GARROD had accurately described the disease and given it the name of "rheumatoid" arthritis. The differentiation between it and osteo-arthritis was clearly defined by Sir WILLIAM HALE-WHITE and others, and in all countries the belief has been gaining ground that in the rheumatoid arthritis of the young we are dealing with a specific infective disease. Its rapid onset, especially in adolescents, with profound constitutional disturbance and destruction of tissues, all point to a special or specific poison, probably allied to although distinct from the rheumatic fever which invades a different set of tissues and often attacks the heart muscle. But in spite of the growth of knowledge, for most of these decades, as Dr. RALPH PEMBERTON once remarked, this disease has been regarded with relative indifference by the medical profession, and to this reason Lord HORDER has no doubt rightly ascribed the fact that the treatment offered has been all manner of pseudo-science. It was undoubtedly the reports made to the Ministry of Health by Dr. ALISON GLOVER in 1924 and 1928 that first opened medical eyes to the general importance of this form of rheumatoid arthritis in women and to its devastating economic results. At ages between 25 to 34 years it is known that six times as many insured women as insured men are invalided from work, and these figures of course do not include the delicate girls who are unable to work at all nor the housewives occupied at home. There is an unhappy predilection of the disease for northern climates such as our own, and some continental writers have called it the "British" arthritis. And it is now all too clear that it is the younger women of child-bearing age who are the main sufferers, and that the treatment which is at present available does not rescue them from the steady progression of the disease to a state of more or less complete crippledom.

It may be that we have to deal here with a disease whose progress on a certain kind of soil is inevitable, or which is little amenable to remedies of any kind; and as long as the therapeutic armoury includes only baths and potions there may be no more success than some relief of the most prominent symptoms. But those who have not forgotten the story of tuberculosis may recall that it was not until the symptomatic treatment gave place to a direct attack on improving the bodily resistance that hope first began to dawn. It was in a relatively damp and sunless valley of the Black Forest that OTTO WALTHER demonstrated to an incredulous world what could be done by hardening the body and increasing its natural resources against the onslaught of tubercle. No one can claim for Nordrach a monopoly of climatic advantage or of clinical knowledge, but it is a fact that from that venture of faith arose the proselytes who initiated the modern campaign against tuberculosis. Dr. FOX would have us do something of the same kind for rheumatoid arthritis. In a postscript to his republished and extended lecture[1] he urges that special provision should be made for the main sufferers from rheumatoid arthritis in the form of Rest Houses. These young women are anæmic, feeble, languid, always more or less in pain, easily tired, easily chilled, their joints inflamed, their muscles rapidly wasting. They need, he feels sure, a prolonged special rest cure. Such a Rest House would provide a combination of curative methods within its own bounds; adequate physical treatment would be available, but only as an adjuvant to the fundamental period of three to six months' rest under medical supervision.

The direction of such a Rest House would give opportunity for investigating the disturbances of function which recent observers believe to be at the root of rheumatoid disease. Here too would be place for a systematic study of body heat, and of the skin and circulation with especial reference to the effects of cold; for once these patients can be brought to a condition in which they again respond to the normal stimuli of our winter and spring climate, half the battle would be won. Dr. FOX himself attaches value to the use of pure sulphur waters in the treatment, and such waters are not available nearer than Wales, Ireland, or the north of Scotland. But the practical value of an object lesson is much diminished by remoteness, and we have an impression that his suggestion of Southend-on-Sea as a locality for such a Rest House is a wise one. The climate there is suitable for treatment at all seasons of the year and the estuary mud, unattractive as it may be in other respects, makes excellent soothing baths. In the Thames basin too it should be easy to secure the sympathetic interest of public-spirited people prepared to make the venture a success. The proposal is not of course unique. If Prof. DAVIDSON has his way—as our Scottish correspondent reported last week—something on similar lines might come into being in Aberdeen.

[1] Arthritis in Women: A Clinical Survey. By R. Fortescue Fox, M.D., F.R.C.P., President of the International League against Rheumatism. London: H. K. Lewis and Co., Ltd. 1936. Pp. 35. 2*s*. 6*d*.

THE IMMUNISING ANTIGENS OF BACTERIA

FROM the beginnings of bacteriology attempts were made to determine the cell-constituents of pathogenic bacteria. The early work was hampered, not so much by inadequate chemical or bacteriological technique, as by lack of a definite objective. By suitable treatment of large quantities of dead bacteria a number of more or less definite chemical substances were obtained; but their interest was chiefly intrinsic, and there was little to indicate which of them gave rise to morbid effects. With the realisation that bacterial species are not necessarily fixed but undergo spontaneous or induced changes in their properties, chemical analysis had a definite question to answer. What, for example, did PASTEUR'S "attenuated" anthrax bacillus lack that endowed the natural anthrax bacillus with its virulence? The occurrence of variants of a bacterial species morphologically different from their parents presented a related problem—the chemical constitution of the particular anatomical feature present in one form and not in the other. There are few easily observed morphological changes in bacteria, but they include the loss or acquisition of a capsule, and the loss of flagella. The capsulated pneumococcus was the first bacterium to be analysed in detail by chemical methods. This coccus can occur in a non-capsulated form which is relatively avirulent, and by comparative analyses of the two forms the capsular substance was found to be a complex carbohydrate, the now familiar specific polysaccharide. Each of the virulent pneumococcal "types" differs from the other types by reason of the differing chemical structure of, among other things, these polysaccharides; and to a certain extent the behaviour of the pneumococcus in the host can be described in terms of the specific polysaccharide substance. There were, however, certain discrepancies between the properties of the polysaccharides isolated and those of similar substances present in the body fluids of the pneumococcus-infected host. It has lately been demonstrated[1] that the relatively brutal chemical procedures to which the pneumococci were subjected during chemical fractionation removed from the polysaccharide molecule the acetyl groups, leaving a substance still capable of reacting with antipneumococcal sera, and still determining the type-specificity of the organism. Acetylation of this substance confers upon it important immunising properties, and it appears that the polysaccharide is present in the acetylated form in the pneumococcus. The serological study of the de-acetylated polysaccharide has been particularly fruitful, but our understanding of antipneumococcal immunity was certainly delayed because the criterion of importance adopted for the isolated substances was primarily an in-vitro serological one.

Flagellated bacteria (the so-called "H" forms) of the colon-typhoid group exemplify the other main morphological variation, often throwing variants without flagella (the so-called "O" forms). The flagella contain powerful antigens responsible for making a patient's serum positive in a Widal test, but they play a minor part only in producing disease and in stimulating immunity. The O antigens, in the body of the bacteria, are of prime immunological importance. Like the capsular antigens of the pneumococcus, they may be lost by the bacilli in certain circumstances, and the resulting variants are feebly virulent and poor in immunising power. The adequacy of the virulent O form for the manufacture of effective vaccines was questioned by FELIX,[2] who described a new serological variant in freshly isolated, living typhoid bacilli. The variants are more virulent and better immunising agents than the accepted typhoid strains, and FELIX named the hypothetical substance responsible for their peculiar properties the "Vi," or Virulence, antigen. This antigen is destroyed by mild heating and by the action of certain chemical preservatives used in the manufacture of vaccines. Antisera produced by horses immunised with a Vi strain are claimed by FELIX and his co-workers to be effective agents in the treatment of enteric fever.

It is obviously important that the nature of an apparently powerful immunising agent like the Vi antigen should be determined. The antigen is recognisable serologically, but the example of the de-acetylated pneumococcus polysaccharide is a warning against the common fallacy of arguing from a serological to an immunological entity. A purified end-product of chemical fractionation may be precipitated by an immune serum as effectively as a crude watery extract of the bacterium so treated, but this fact is no guarantee that the precipitated substance has remained unchanged during the process. The ultimate isolation of an immunising substance is most safely achieved by rigid tests of all products for actual immunising power. This method was adopted by Prof. TOPLEY and Prof. RAISTRICK and their colleagues in their isolation of the antigens of *Bacterium typhi-murium* and has been applied to their study of the Vi antigens of the typhoid bacilli published in our present issue. The immunising fraction of *typhi-murium* survived tryptic digestion of acetone-extracted bacteria, and could be precipitated from the tryptic digests. The typhoid antigens are apparently similar, and analysis, on these lines, of a Vi strain and an ordinarily virulent O form of the typhoid bacillus reveal definite and significant differences in the immunising and chemical behaviour between comparable fractions of the two strains. The most powerful immunising antigen is derived from the Vi strains, but the O antigens are far from ineffective in this respect, for repeated injections of the O antigen are as effective as two injections of the Vi antigen in protecting the mouse from lethal doses of living typhoid bacilli. Though Vi forms are probably the best immunising agents, the O forms hitherto employed in the preparation of vaccines have a definite efficacy of their own.

[1] Avery, O. T., and Goebel, W. F. (1933) *J. exp. Med.* 58, 731

[2] See references given by Topley and others (p. 256) of our present issue.

Though the results so far obtained are sufficiently clear-cut, the exact nature of the antigens remains to be determined. The work is far from easy; one of the chief difficulties lies in the choice of suitable chemical methods of isolation. It is instructive in this respect to compare the methods used for the typhoid bacilli with those used by Dr. STAMP and Miss HENDRY for the isolation of immunising fractions of hæmolytic streptococci (see p. 257). The typhoid fractions are polysaccharides linked on to other molecules, whereas the active streptococcal fractions appear to be protein in nature; and the dissimilarity illustrates the laborious and groping methods of analysis that are needed for each fresh bacterium tackled. Both papers raise a point of immediate interest—the isolation of relatively pure, stable substances capable of inducing good antibacterial immunity. The ease of manufacture and the effectiveness of streptococcal antitoxin has overshadowed the possible value of antibacterial sera. But in view of the doubts of the efficacy of streptococcal antitoxins expressed, for example, in the report of L. COLEBROOK,[1] the problem of attacking the infecting cocci themselves as well as the exotoxins they produce, becomes more urgent. The hæmolytic streptococci are divisible by the precipitin reaction of Lancefield into a number of subgroups, each antigenically distinct. Dr. STAMP and Miss HENDRY, in obtaining effective fractions from a streptococcus belonging to Lancefield's human-pathogenic group A, and from a cattle-pathogenic strain of her group C, have made a beginning of the immunological analysis of this highly complex group.

One more point deserves mention. Successful isolation depends on adequate assay of the products, and here the difficulties are more economic than technical. A dependable estimate of the immunising property of a single fraction uses, if the test is to be adequately controlled, sixty mice. A complete survey of all the fractions from a bacterial analysis may require prohibitive numbers of animals. But without the foundation of the statistically significant results that follow the use of adequate numbers of test animals, very little of value can come out of immunological experiments except by happy, but scarcely dependable, chance.

SIR HENRY WELLCOME'S WILL

PARTICULARS of the will of the late Sir Henry Wellcome were published in September last when the gross value of the estate was declared, but some time must elapse before the exact sum in death duties will be arrived at. Specific bequests were considerable, while in respect of the rest there was an appointment of trustees, the terms of which are set out by them in a letter which appears this week in our columns. The trustees here explain why they have been unable to consider appeals for contributions which have arisen from various research undertakings, received as a natural sequence to the general knowledge concerning the directions in which the bulk of the fortune was to be used.

The letter from the trustees is so detailed and clear as to leave no need for exposition. By the terms of the will the shares of the Wellcome Foundation, the company formed to take over the whole of the business activities of Burroughs Wellcome and Co., became vested in trustees, while provisions have been made for a welfare fund for the benefit of employees of the Foundation, for the payment of certain specified annuities, and for the erection and maintenance of a memorial building to the testator's parents. The Foundation includes the various institutions and museums which were established by Sir Henry Wellcome, who held the whole of the share capital, and this is now vested in the trustees, in accordance with the testator's instructions. Subject to the charges mentioned above, the remainder of the disposable profits of the Foundation were, by the terms of the will, to be employed for the maintenance of two funds—the Research Undertaking Charity and the Museum and Library Charity. The scope of these funds is set out in the letter of the trustees, and we have presented to us a concrete conception of the mighty influence which well-directed scientific research can have upon world conditions. Thus the responsibility placed upon the trustees is a truly heavy one and its discharge will call for great knowledge of the directions which medical progress may take, and proportionate judgment in the disposal of large sums of money. The trustees are: Mr. G. Hudson Lyall and Mr. L. C. Bullock, members of a city firm of solicitors; Mr. Martin Price, a chartered accountant; Sir Henry Dale, F.R.S.; and Prof. T. R. Elliott, F.R.S. The testament imposed upon the trustees an obligation to enter into a covenant not to be engaged in, or in any way to assist in, any business competing with the Burroughs Wellcome company, and the scientific and medical trustees, Sir Henry Dale and Prof. Elliott, might be placed in a difficulty if certain words in the covenant were held to restrict their performance of official or general duties towards medical science, or to imply their particular concern with the business interests of the Wellcome Foundation. Wisely, therefore, legal advice was sought to make clear the position, and appended to the letter of the trustees will be found a copy of an Order obtained from the High Court of Justice dealing with the situation.

The endowment for the benefit of mankind, designed and made possible by Sir Henry Wellcome's will, is remarkable not only for its generosity but for its foresight. The terms are sufficiently precise to enable the testator's objects to be realised, while those objects contemplate an indefinite development within broadly specified lines.

THE death occurred on Saturday last of Dr. Henry Alexander Osborn, a well-known pathologist working in Liverpool. The tragedy occurred through an infection contracted in the course of his work. He was only 43 years of age.

[1] Colebrook, L. (1934) *Lancet*, **2**, 1367; (1935) **1**, 1085.

ANNOTATIONS

KING GEORGE V MEMORIAL

ONE evening last week an appeal was broadcast by Lord Dawson of Penn on behalf of the King George National Memorial Fund for the provision of playing fields throughout the country. Lord Dawson made a moving reference to the closing scenes of the life of King George V, emphasising his resolute performance of duties during declining health, and his deep concern for his people. The object of the Memorial must commend itself to all medical men as being devised for the well-being of youth. King George, said Lord Dawson, saw clearly that the future prosperity of the country lay with youth, and subscribed to this vision by adding that "as time goes on it will be found that the school which teaches health, the hospital which restores health, and the open spaces which make for health are all part of one great conception." Lord Dawson's appeal was made on the last day of the Odd Shillings and Pence Appeal, but this does not mean that the appeal as a whole is closed, an impression which it is hoped our readers will not allow their patients and friends to remain under. Contributions to the fund should be sent to the Lord Mayor of London at the Mansion House.

THE TREND OF THERAPEUTICS

IT is notoriously difficult to write contemporary history, yet we are ever striving to assess the value of our own contribution to the story of mankind. Those who try to see present events impartially and in proper perspective are, consciously or unconsciously, making the difficult experiment of transporting themselves into the next century, and viewing the present through the eyes of a future generation. Too often, we feel, such adventurers deserve little sympathy, but in medicine their function is obvious and important. It is not only interesting, but vital, that growing-points should be recognised and nourished. To-day we are on the threshold of developments in medicine which may parallel those of surgery during the last seventy-five years. The recent rapid progress in the field of endocrinology has furnished the occasion for some of the finest chemical work of the century, and the chemists are no longer technicians only, but pioneers. The discovery of the constitution of a hormone is a major event, and its successful synthesis hardly less so, but the research worker does not now retire at this stage in favour of the manufacturer and the clinician. The hormone may contain two or more well-known chemical groupings of elements, and it is important to know which of these is responsible for the characteristic effect. More important still is the fact that each of these groupings relates the substance to a whole family of other compounds, natural or synthetic, all containing different modifications of the same nucleus. The various relatives of adrenaline, such as ephedrine and benzedrine, and the family of œstrogenic compounds are familiar examples of this. Their clinical importance lies in the probability that different members of the series will be found adapted to different circumstances in treatment. We use adrenaline in asthma as an emergency measure, but ephedrine for a prolonged effect.

We have long been familiar with the same principle in the pharmacology of the nitrites, but much more complicated drugs are now being subjected to the same kind of scrutiny and experiment. Our breakfast literature bears witness to the zealous search for the perfect drug, and its chemical name, formidable in its lack of hyphens, means that it is not an accidental discovery, but a carefully thought-out product which the manufacturer would have us believe is eugenically perfect. Usually he either overrates or underrates our intelligence, but he faithfully mirrors the modern emphasis on the relation between chemical structure and biological activity. Why this should coincide with a decline in the importance of pharmacology in the medical curriculum is difficult to understand.

On another page are reports by Mr. J. S. Maxwell and Dr. Chassar Moir on the clinical trial of carbaminoylcholine. Even H. G. Wells might have paused before predicting a pharmacological substitute for the catheter, yet here we find evidence that, so far as post-operative and post-partum retention are concerned, such a substitute has been found. Sir Henry Dale and Prof. Otto Loewi have lately received the Nobel prize for their researches into the physiological importance of acetylcholine in transmitting the effects of nerve impulses. The control and innervation of the bladder have had much attention from research workers in recent years, both in this country and in America. For many years the family of compounds to which acetylcholine belongs has been the subject of chemical and pharmacological investigation. In the trial of carbaminoylcholine in the treatment of retention of urine we have an experiment based on straightforward deduction from facts which have been largely established in the laboratory. It is, perhaps, a coincidence that the same series of physiological researches formed the basis of a similar experiment in the trial of Prostigmin for myasthenia gravis, but there can be little doubt that we are destined to become increasingly familiar with such experimentation. We are daily amassing more and more precise information about the actions and chemistry of hormones, drugs, vitamins, and other highly potent substances, such as acetylcholine, produced locally in the body. Precision of knowledge means precision in treatment, and precision in treatment will do more than many conferences to simplify the medical curriculum.

THE CANCER VIRUS

A SINGULARLY clear paper by Dr. C. Russell Amies from the Lister Institute in the January issue of the *Journal of Pathology and Bacteriology* goes far to confirm and clarify the work of Ledingham and Gye on the particulate nature of the active agent in bird tumours. Tumour extracts ground with sand and finally frozen and thawed several times to kill any cells which might survive, contain a heterogeneous collection of particles. Moderate centrifugalisation removes most of this debris and leaves the infectivity of the supernatant liquid unimpaired. If this liquid is then centrifuged more violently—e.g., 12,000 revolutions per minute for 2 hours or 33,000 for half an hour—the whole of the infective agent is thrown to the bottom of the tube and the supernatant fluid is innocuous though it still contains fine particles visible by dark-ground illumination. That the agent is particulate is not new, but these experiments show that infectivity is

associated with particles of a certain size, and that when these are emulsified in liquid and tested on fowls they represent the whole of the infectivity of the original extract. Microscopically these preparations contain a great number of particles of approximately the same size and of similar optical appearance: they are too small to be seen clearly but their appearance would be compatible with their being about 0·1μ in diameter, which is in reasonable correspondence with the size determined by Andrewes and Elford by filtration and centrifugalisation. The number of particles in a suspension was not determined but Amies makes the point that it was obviously greatly in excess of the number required on the assumption that one particle could start a tumour—which suggests that none of these very small bodies can do anything unless there are many of them: the unit of action may well be a crowd rather than an individual. If these particles are not the actual tumour virus, the tumour-exciting property evidently resides in and cannot be dissociated from them. The suspensions are agglutinated by the serum of most fowls carrying tumours and of some normal fowls though not by the serum of chickens, a result which by itself might be due to the particles being the result rather than the cause of the disease: they show however they can hardly be normal fowl tissue. Agglutinating sera generally also have the power of neutralising the infectivity of suspensions if the two are allowed to react together for a few hours before being inoculated into the test hen. Suspensions are not agglutinated by antifowl serum made by dosing rabbits with fowl blood, which is the best available evidence that they do not contain fowl protein. But in a series of striking experiments, previously made in a cruder way by Gye and Purdy, Dr. Amies shows that this antifowl serum will neutralise the infectivity of his purified emulsions, and draws the natural deduction that the tumour agent contains something which is normally present in fowl tissue. This is difficult to reconcile with the view that the tumour virus is an independent organism, unless it is a parasite which in some curious way takes on a stamp from its host.

TRANSURETHRAL OPERATIONS

DURING the past five years the great value of transurethral operations for the relief of various disorders of the bladder, urethra, and prostate has become apparent, for they can now be employed in many cases in which open surgical operations were formerly required. Elderly patients who, because of the risk involved, declined to submit to other types of operation, are now reporting to the urologist for the transurethral operation and are being relieved of symptoms with minimal risk. Although resection of the prostate gland for enlargment is by far the commonest of these procedures, it is by no means the only one. Extensive tumours of the bladder that previously called for open excision can be tackled with a McCarthy resectotome, the bulk of the growth being rapidly removed with a cutting current and the pedicle or base afterwards thoroughly destroyed by electrocoagulation. In a review of the subject Dr. G. J. Thompson of the Mayo Clinic claims [1] also that the scope of litholapaxy as opposed to suprapubic removal has been greatly increased. In his opinion prostatic enlargement is no contra-indication to the use of the lithotrite, and he is in the habit of treating both conditions at one sitting, crushing the stone and then dealing with the enlargement by means of an electrotome. Other conditions in which the electrotome will be found useful are prostatic calculi, prostatitis, and prostatic abscesses, both acute and chronic. Even vesical dysfunction due to a lesion of the central nervous system may yield to the division of the internal sphincter by means either of a McCarthy instrument or of a Collings's knife. For the results of resection for prostatic obstruction Dr. Thompson gives very impressive figures. Of 1987 patients subjected to transurethral resection, for either benign or malignant disease of the prostate, during the four years 1932–35, only 14 died, a mortality of 0·7 per cent.

[1] *J. Amer. med. Ass.* 1936, **107**, 1954.

HISTORY OF BUBONIC PLAGUE IN PARIS

A FAMOUS mystery story had as its plot the disappearance of an Englishwoman during the night after her arrival, in company with her daughter, in Paris. No trace of her existence could be found next day and her daughter's frantic protests met blank denials—from hotel staff, police and, finally from the highest officials—that she had ever arrived. The solution, it will be remembered, was that the great Exposition of 1900 had just opened, that the lady had died of bubonic plague, and that news of this must at all costs be suppressed.

Allegations of such official suppression, if they ever existed outside fiction, are effectively answered in an account by Dr. E. Joltrain [1] of the 138 bacteriologically confirmed cases of plague observed in Paris from 1917 to 1937. The last two years have been happily free and, in fact, there have been but 6 cases in all in the last ten years. The first case—indeed, so far as is known, the first for almost three hundred years—was in December, 1917. Gland puncture of a dying child admitted to the Bretonneau with axillary adenitis gave a microscopical picture typical of plague. No other fact and no other cases were discoverable and the observation remained a bacteriological curiosity until 1920. Then another similar case occurred; but this time it was followed not only by full laboratory confirmation but also by the detection of a whole series of other cases, all more or less directly in communication and all among rag-picker families, though in four separate districts. These four foci, in slum dwellings in Clichy, Saint-Ouen, Levallois, and Pantin, continued to furnish cases throughout 1920, the total for the year being 106 notified, 91 confirmed, 37 fatal. There were only 3 deaths (6 per cent.) among the 52 treated cases, in most of which large doses (100–200 c.cm.) of the Pasteur Institute antiplague serum were given; but among the 39 untreated no less than 34 (87 per cent.) were fatal. By the end of 1920 the plague was beginning to abate and there were only 10, 5, and 11 cases, bacteriologically confirmed, in 1921, 1922, and 1923 respectively. Joltrain mentions that in 1920 there were almost as many, with even higher mortality, in Marseilles; but the history of Marseilles would require a chapter to itself. It is sometimes forgotten that Paris, too, is a seaport and it is probable, though the facts can now never be established, that the infection was ship-borne. Joltrain says categorically that in 1917 plague rats escaped at Levallois from a ship bringing coal from England after a previous voyage to India. One may be permitted to doubt so elegant a sequence: in fact, no plague-infected ship arrived in Cardiff in 1917 and, though more than one arrived in the Thames in that year, these were thoroughly fumigated before clearance and no plague rats were found ashore

[1] *Bull. Acad. Méd. Paris*, 1936, **116**, 601.

in the Port of London then or since. That rat plague existed in Paris during the pre-epidemic years of 1918–19 is, however, highly probable. It was recalled, when inquiry was made, that dead rats had been found with abnormal frequency, and two of the first persons to get plague in 1920 had actually handled a sick rat and been bitten by its fleas. Since then examination of rats for plague infection has been regular in Paris. In 1921 7000 were examined by Tanon and Neveu in their special plague laboratory; these yielded 41 positives; in 1924, 2840 rats gave 50 positives; as late as 1933, 2770 rats gave 5 positives; and it is far from certain that rat plague does not still exist.

Little new is to be learnt about the epidemiology of plague from the Paris observations. The cycle is as usual rat→flea→man, and infestation of the rats by *Xenopsylla cheopis*, as well as the common rat-flea, *Ceratophyllus fasciatus*, is noted by Joltrain. The main lesson—and it is one that we in England should not scorn—is that the existence of rat-infested slum dwellings in a city is a perpetual invitation to invasion by bubonic plague. It is no doubt true, as Indian experience shows, that even when such plague-infected slum foci exist, the disease will spread hardly, if at all, from them to quarters of proper sanitary construction. But the mysterious penetrations of which rats are capable, even in urban districts so unfavourable to them as the City of London, would create enormous anxiety, nourished, as it would be, by sporadic cases of the dread disease in the most unexpected places, as happened indeed in Paris. So no effort should be spared to reduce our rat population to a density low enough to prevent the spread of plague among them. Our experience in East Anglia 25 years ago shows that such reduction will, in fact, extinguish a rodent enzoötic; though, it is true, that was under rural conditions, where dispersal of rats was easy. Vigilance against introduction remains the best defence and the experience of Paris is a warning of the consequences of its failure.

THE APPENDIX IN MEASLES

DISCUSSING appendicitis as a complication of the acute specific diseases, Ronaldson [1] finds that although some French writers attach importance to its supposed relationship to scarlet fever, the experience of several of the large fever hospitals in London shows that the association is rare. He records two cases under his own observation, but discovers no demonstrable connexion between the patients' appendicitis and the scarlet fever from which they were convalescing. Indeed, he suggests that the appendix, "the abdominal tonsil," seems to enjoy a high degree of immunity from the septic manifestations of the disease. The possible association of appendix symptoms with measles is distinctly more interesting, for although suppurative appendicitis is very rare, Ronaldson says that transient pain in the iliac region may be a feature of the first day of the prodromal stage of measles, and surgical aid may thus be sought unnecessarily. Wegelin [2] has just recorded three cases in which appendicectomy, with uneventful recovery, was performed in children who developed acute appendicitis in the prodromal or earliest eruptive stage of measles, and in view of his remarks about the mildness of the inflammatory changes found on microscopical examination it seems possible that these were all examples of the appendicular colic alluded to by Ronaldson. Both authors refer to the histological investigations of the tonsils in early measles carried out independently and almost concurrently by A. S. Warthin and W. Finkeldey in 1931. These workers found characteristic giant cells in the tonsillar tissue and, in 1932, M. Herzberg demonstrated similar giant cells in the mucosa of the appendix removed from measles patients. In all of Wegelin's cases identical giant cells were present in the lymphatic tissue of the appendix and in one of them they were found in the neighbouring mesenteric glands also. Wegelin thinks that the occurrence of the Warthin-Finkeldey giant cells is specific for measles and of diagnostic importance. More practical, however, is Ronaldson's advice that appendicular symptoms in young subjects should lead to a search for Koplik's spots, whose discovery may obviate too hasty interference. On the other hand Wegelin refers to a case recorded by Hathaway in which a boy in the prodromal stage of measles, infected by his sister, died from perforative appendicitis. Histological examination revealed giant cells in the bronchial and retroperitoneal lymphatic glands and in the spleen, but not in the appendix or mesenteric lymphatic glands. Unless the patient can be kept under constant observation, as in hospital, most practitioners, having diagnosed measles in a child who also presents symptoms pointing to appendicitis, will want to share their responsibility with a surgical colleague at the earliest moment possible.

[1] Ronaldson, G. W. (1936) *Brit. J. Child. Dis.* **33**, 85.
[2] Wegelin, C. (1937) *Schweiz. med. Wschr.* **67**, 1.

EXACT KNOWLEDGE OF OUR COLONIES

"IT would scarcely be an exaggeration to say that the majority of English people of the present day have but the vaguest notions of the extent and resources of the Colonial Empire." Starting from this submission, Major P. Granville Edge (lecturer in the division of epidemiology and vital statistics in the London School of Hygiene) in a paper read to the Royal Statistical Society at their meeting on Jan. 19th set about the task of giving the statistician, at least, no excuse for his ignorance of the demography of the British Colonial possessions, a task most ably fulfilled. These possessions, he said, comprise upwards of fifty distinct governments, have territories extending over an area of more than two million square miles, and a population of over 58 millions, or double the total inhabitants of Canada, Australia, New Zealand, and South Africa. Rather more than nine-tenths of this area and this population lies within the Tropics, and we have to deal with a "bewildering medley of races, religions, languages, and customs." Using the annual medical and sanitary reports of the different territories Major Edge discussed the rates of birth, death, infant mortality, and sickness which are recorded. Such material must be handled with caution, for the difficulties under which medical officers concerned with native races have often to work lead to inevitable imperfections. To take one example, Major Edge refers to the "bad-luck" belief which may cause native parents to omit any reference to the eldest surviving child. A husband with two wives and eight children reports seven offspring; the two wives interrogated about their own offspring report six, each deducting one; interrogated about each other's offspring they give the true number, eight.

But such difficulties in the way of census taking and of registration, and the present difficulty—perhaps impossibility—of interpreting some of the figures obtained, must clearly not lead to a counsel of despair. The road to accuracy may be long and

troublesome but, however slowly, it must be followed. Only with a knowledge of the numbers and the constitution of a people can the machinery of government function properly and sanitary measures be taken; only with a knowledge of vital statistical rates can the effects of such measures be assessed. Those on the spot who take interest in these matters and make real attempts to collect the data need all the encouragement that can be given them, and not, as Dr. Balfour Kirk remarked in the discussion following Major Edge's paper, the damning, with or without faint praise, of their efforts by those accustomed to dealing with figures collected under the registration system of a "civilised" country. It is also a serious mistake if the worker in the colonies is deterred from his vital statistical studies by, to quote Dr. Kirk's words, the mathematical smoke-screen with which he is faced when he consults the work of the professional statistician.

Much can be done under primitive conditions by simple statistical means, by the careful and logical consideration of the figures collected. But at present, Prof. Greenwood suggested, we regard our colonial vital statistics much less seriously than do the Dutch, a difference which lies, in Major Edge's view, in the fact that in many of our possessions we are content to record the ascertained data, while the Dutch are concerned to interpret them—to get below the figures and to relate them to other recorded facts such as environmental conditions. As the lecturer has suggested in another place,[1] facts are stubborn things and often seem dull, yet they are the seeds of imaginative ideas which the wit of man is often able to transmute into practical realities. There is no dearth of problems to solve if the interest is there to solve them. Major Edge's paper should do much to arouse that interest and to create a more serious regard for medico-statistical work amongst the native races in the British possessions.

HEATED ETHER VAPOUR

IT has been claimed for a good many years that there is advantage in offering ether vapour to a patient warm rather than cold. Shipway's widely used apparatus had this for one of its primary objects. It must be admitted, however, that some have always maintained that the advantage is slight and counterbalanced by attendant disadvantages. They have said that the vapour, whatever its temperature when inhaled, reaches blood heat before it enters the pulmonary alveoli and that the only value of warming it is to conserve the small amount of body heat expended in raising the vapour temperature to that of the body. Even this gain, they believe, is more than offset by the increase of sweating associated with inhalation of warm vapour. This argument takes no account of the newer possibilities of superheated ether vapour, and in the light of Tiegel's observations [2] the question assumes new importance. German authorities who have employed this vapour, of a temperature much higher than that commonly used here, declare that it is less irritating than ordinary ether vapour, that it does not produce the same mucous secretion, that it gives a prolonged analgesia both before and after true anæsthesia, that it is very quickly recovered from, and far less often followed by nausea or sickness. Obviously these claims if substantiated mark a real advance. The necessary apparatus is complicated and it will be of much practical benefit if the comparatively simple instrument used by Dr. Garnet King of Los Angeles supplies a vapour of temperature high enough to have the virtues of Tiegel's method. King's Thermanester is, we believe, now to be obtained in this country, and doubtless anæsthetists are trying the new version of warmed ether in order to determine its true value. That it should be less irritating to the upper air-passage and therefore more easily and comfortably inhaled than cool vapour seems on the face of it highly probable. The pumping action of Shipway's apparatus may have impeded this effect during induction.

[1] Introd. note to *Trop. Dis. Bull.* October, 1936, Supp. pp. 1–276.
[2] Tiegel, M. (1933) *Zbl. Chir.* **60**, 1941; **61**, 2313 and 2908.

THE DISTRIBUTION OF STATE-REGISTERED NURSES

EACH year State-registered nurses are sent official forms which they have to fill in and return with retention fees if they wish to keep their names on the register. This year 72,059 nurses were circularised by the General Nursing Council for England and Wales and, for the first time, a questionnaire was issued with the forms in order to ascertain the distribution of State-registered nurses through the different branches of the profession. Only 4002, less than 6 per cent., failed to respond to the questionnaire, and these were mostly nurses living abroad; of the rest 55,956 were and 12,101 are not "in active work." By far the largest group (27,196) are holding hospital appointments; 15,381 are private nurses; 5029 are public health nurses (including industrial nurses); 4643 are district nurses; and 1646 are taking further training. These five groups account for nearly 54,000 women—none of the 24 occupations among which the remaining 2000 are distributed includes as many as 300. The very large proportion (approximately half) of State-registered nurses employed in institutions lends force to the plea made by THE LANCET Commission on Nursing for a greater measure of personal freedom for them when they are off duty. There are still far too many hospitals in which qualified staff nurses are subjected to much the same restrictions as are appropriate for probationers, and this is certainly one of the factors influencing the shortage of suitable candidates for the profession.

USE OF THE DEVELOPING EGG IN VIRUS RESEARCH

THE inability of viruses to multiply apart from living cells has undoubtedly been one of the chief contributory factors to the difficulty of virus research. The isolation of a virus and its maintenance in the laboratory has depended on the use of experimental animals and, though the tissue culture technique, more particularly in its simplified form devised by H. B. and M. C. Maitland,[1] has been of great service in the study of viruses, it has only replaced the living animal to a very limited extent. This unavoidable reliance on the animals carries with it many disadvantages. Some viruses causing disease in man, such as those of zoster and varicella, are apparently unable to infect other animals, and so remain largely unstudied; others like those of the common cold can only be transmitted to a species of animal which because of its expense must be used sparingly. Even where a suitable experimental animal exists all sorts of pitfalls, such as the presence of dormant viruses or the occurrence of cross-infection, exist to entrap the unwary or complicate the task of the experienced worker. However the work done during the last four

[1] Maitland, H. B., and Maitland, M. C. (1928) *Lancet*, **2**, 596.

or five years on the suitability of the chorio-allantoic membrane of the developing egg for the cultivation and study of viruses indicates a way out of many of these difficulties. First used by Rous and Murphy in 1911 [2] in the study of fowl tumours, the membrane was found by Goodpasture and Woodruff,[3] some twenty years later, to be admirably adapted to virus work. Since then a number of virus workers have made use of this new technique, and of these one of the most successful and enthusiastic has been F. M. Burnet. While working in this country at the National Institute of Medical Research, and since his return to Australia, Dr. Burnet, either alone or in collaboration with others, has published a series of papers indicating the scope of this new method. He has now written a very valuable monograph on the subject which is published by the Medical Research Council.[4] This report is not just a survey of published work, it contains many new observations and suggestions as to the possibilities of this method. It must not be imagined, of course, that the egg membrane is available for use with all animal viruses, some viruses fail entirely to infect the chorio-allantoic cells. But it is quite surprising on reading this report to find how many viruses can be grown under these conditions. It has even been possible by serial passage to adapt the virus of epidemic influenza to the egg membrane, and the possibility of using these undifferentiated cells in the study of viruses which it has been impossible to establish in experimental animals naturally occurs to one. Quite apart from this the egg membrane constitutes an ideal "animal" for virus study. It is very cheap, and requires the minimum of attention. It is free from contaminating bacteria and viruses and cross-infections do not occur. Further the chorio-allantoic membrane provides a beautifully simple tissue in which to study the histological reactions to virus infections. There is not the least doubt that this new technique will be extensively adopted in virus research, and those workers contemplating its use will be grateful to Burnet for this lucid monograph.

HOME v. RESTAURANT IN RUSSIA

IF people do not get the right food the reason may be that they cannot afford it, or do not choose it; or they may spoil good material before it reaches the table. It has been noticed that those who live near the borderline of starvation are often unwilling to listen to advice about the choice and preparation of their meals, and this reluctance must be borne in mind by those who hold that if our population is to be better fed the steps most needful are educational rather than economic. In a valuable report reviewed on p. 293 Prof. Cathcart and Mrs. Murray reach conclusions supporting the opinion that what is wanted is not so much more food as more intelligent use of it. Whether the data presented in the report suffice in themselves to justify such a conclusion may be questioned, but none can doubt at least that sound housekeeping is a very important element in sound nutrition. The question is how to secure it; and this is one of the many questions which is now being answered in Soviet Russia differently from elsewhere. The Russians in their particular circumstances despaired of efficient private housekeeping and from experiments in supplying canteen meals in time of scarcity they have passed on to the widespread practice of "social feeding." It may seem a small matter whether people are fed at home or in restaurants, but after reading their clear account [1] of what is being done in the U.S.S.R. one sees why Mr. Le Gros Clark and Miss Brinton describe this as "one of the greatest cultural experiments the world has seen." The experiment is still an experiment, for as food becomes more plentiful the Soviet citizen may return to his domestic habits. But there are undoubtedly big advantages in centralising food consumption. "A civilised community, it is insisted, does not waste its labour, time, and fuel. It has something better to do—unlimited creative work, and the enjoyment of the fullest leisure it can win for itself." It has been calculated that on the old family system cooking, laundry, and the care of children required the services of 30 million Russians for a 10-hour day. Collective methods mean a saving of something like five-sixths in the labour of cooking, which is important in itself to a country struggling to make good. But it has an even greater importance if by the application of scientific methods everyone can have not only sound food, well-cooked food, and attractive food, but even the right kind of food for his occupation or his digestive capabilities. In Soviet Russia there is no large body of unemployed available to fill gaps, and if a worker has to go sick the loss is directly felt by those who employ him. The importance of industrial medicine is thus more apparent in the U.S.S.R. than it is here, and correspondingly more attention has been paid to the occupational side of dietetics—so much so that "very soon you will only have to tell the restaurant attendants what your job is and they will serve you with the food best suited to you." (In parentheses it may be noted that the Russian physiologist is supposed to care only for optimum nutrition; he leaves minimum nutrition to the politician.) As for weak digestions, it is said that well over half a million employees daily receive "curative diets" in the factory restaurants. In the past few years food preparation, including the supply of cooked or partly cooked food by "kitchen factories," has come to be recognised as vital to the State, and those who undertake it receive the honourable title of "engineers of social feeding." Moreover, since "nothing is alive that is not controlled from below by the mass of the people," it is a department of affairs in which the public as consumers are encouraged to take a keen interest. If it is true that people who cannot afford adequate food cannot be taught the science of nutrition, it is equally true that a community that is conscious of a growing variety and cheapness in its food supplies can easily be induced to study it both in principle and practice. Perhaps this applies as much to our own country as to the U.S.S.R.

Le Gros Clark and Brinton begin their book with an excellent 40-page outline of the past and present of the Soviet health service.

[2] Rous, P., and Murphy, J. B. (1911) *J. Amer. med. Ass.* **56**, 741.

[3] Woodruff, A. M., and Goodpasture, E. W. (1931) *Amer. J. Path.* **7**, 209.

[4] Burnet, F. M.: Spec. Rep. Ser., Med. Res. Coun., Lond., No. 220. London: H.M. Stationery Office. 1937. Pp. 58. 1*s*.

[1] Men, Medicine and Food in the U.S.S.R. By F. Le Gros Clark, B.A., and L. Noel Brinton, B.A. London: Lawrence and Wishart. 1936. Pp. 173. 5*s*.

INSTITUTE FOR THE SCIENTIFIC TREATMENT OF DELINQUENCY.—A course of lectures on the psychiatry and psychotherapy of delinquency is being given by Dr. Denis Carroll at the West End Hospital for Nervous Diseases, Welbeck-street, London, W., at 6.45 P.M. on Thursdays till March 11th. The course, which is intended for probation officers and social workers, has been arranged by the institute, and further particulars may he had from the secretary, 56, Grosvenor-street, London, W.1.

PRINCIPLES OF MEDICAL STATISTICS

V.—PROBLEMS OF SAMPLING: AVERAGES*

THE observations to which the application of statistical methods is necessary are those, it has been pointed out, which are influenced by numerous causes, the object being to disentangle that multiple causation. It must also be recognised that the observations utilised are nearly always only a sample of all the possible observations that might have been made. For instance the frequency distribution of the stature of Englishmen—i.e., the number of Englishmen of different heights—is not based upon measurements of all Englishmen but only upon some sample of them. The question that immediately arises is how far is the sample representative of the population from which it was drawn, and, bound up with that question, to what extent may the values calculated from the sample—e.g., the mean and standard deviation—be regarded as true estimates of the values in the population sampled. If the mean height of 1000 men is 169 cm. with a standard deviation of 7 cm., may we assert that the values of the mean and standard deviation of all the men of whom these 1000 form a sample are not likely to differ appreciably from 169 and 7? This problem is fundamental to all statistical work and reasoning; a clear conception of its importance is necessary if errors of interpretation are to be avoided, while a knowledge of the statistical technique in determining errors of sampling will allow conclusions to be drawn with a greater degree of security.

ELIMINATION OF BIAS

Consideration must first be given, as previously noted, to the presence of selection or bias in the sample. If owing to the method of collection of the observations, those observations cannot possibly be a representative sample of the total population, then clearly the values calculated from the sample cannot be regarded as true estimates of the population values, and no statistical technique can allow for that kind of error. If the average daily consumption of calories per man-value is found to be 3000 in a group of 200 families from whom particulars are collected of their week's consumption of food, it cannot be deduced that that value is likely to be the true average of all families. Housewives who are willing to undertake the task of giving such particulars may be above the average level of intelligence or be the more careful and thrifty of the population. The sample is, then, not a representative but a somewhat selected sample and there is no evidence as to the degree to which this selection affects the results. That difficulty of interpretation has been discussed in a previous section. In the present discussion we will presume that the sample is "unselected" and devote attention entirely to the problem of the variability which will be found to occur from one sample to another in such values as means, standard deviations, and proportions, due entirely to what are known as the "errors of sampling." Attention may first be given to the mean.

THE MEAN

Let us suppose that we are taking samples from a very large population, or universe, and that we know that an individual in that universe may measure any value from 0 to 9—e.g., we may be recording the number of attacks of the common cold suffered by each person during a specified period, presuming 9 attacks to be the maximum number possible. The mean number of attacks per person and the standard deviation in the whole population we will presume to be known; let the average number of attacks per person be 4·50—i.e., the total attacks during the specified period divided by the number of persons in the universe—and the standard deviation be 2·87 (as found, in the previous section, by calculating

* On line 18 of last week's article in this series the figure should be 37·2 (years) and not as printed.—ED. L.

TABLE IV.—*Number of Colds Suffered by Individuals, Values in Samples of 5.* (*Hypothetical Figures.*)

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	2	6	3	9	7	5	3	0	5	4	5	2	4	1	2	6	6	9	2	3	5	3	9	6	6
	4	9	1	1	7	5	1	0	2	3	9	2	3	5	8	6	5	8	2	3	1	6	1	6	2
	2	7	3	2	3	1	0	3	7	1	2	7	1	7	0	8	8	9	7	8	6	5	5	3	7
	0	5	1	6	6	8	4	3	8	6	9	2	9	3	2	8	1	5	6	5	2	2	4	7	2
	2	9	1	9	7	6	8	6	6	6	8	1	1	5	3	7	3	1	7	1	5	4	2	5	1
Mean of each sample	2·0	7·2	1·8	5·4	6·0	5·0	4·4	2·4	5·6	4·0	6·6	2·8	3·6	4·2	3·0	7·0	4·6	6·4	4·8	4·0	3·8	4·0	4·2	5·4	3·6
Sample No.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	7	7	8	7	2	4	1	3	3	9	4	2	5	9	5	9	7	3	0	2	1	6	9	4	4
	5	0	0	2	5	2	6	5	9	7	1	5	1	7	8	3	6	6	9	3	1	1	8	4	1
	3	8	6	6	4	6	4	7	6	1	7	1	9	5	5	9	1	5	0	6	0	4	1	4	4
	1	5	0	5	9	8	4	4	9	5	3	5	2	3	7	9	9	2	7	4	2	6	7	2	7
	6	5	4	9	6	7	3	5	9	2	4	4	5	8	7	7	3	2	7	0	7	1	8	1	6
Mean of each sample	4·4	5·0	3·6	5·8	5·2	5·4	3·6	4·8	7·2	4·8	3·8	3·4	4·4	6·4	6·4	7·4	5·2	3·6	4·6	3·0	2·2	3·6	6·6	3·0	4·4
Sample No.	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
	9	9	7	0	9	1	0	6	1	9	1	7	3	1	0	3	4	0	3	6	2	7	8	0	1
	9	9	8	9	4	0	6	7	5	2	7	8	7	5	7	6	1	6	3	4	0	2	9	6	9
	1	3	5	3	9	5	2	8	8	4	3	2	0	9	8	5	8	3	9	7	3	8	7	9	2
	0	4	4	1	1	1	5	3	4	7	7	4	5	6	6	8	3	3	9	4	7	0	7	2	2
	6	3	3	2	8	4	6	9	3	3	8	3	8	0	6	0	2	9	5	2	5	1	2	9	0
Mean of each sample	5·0	5·6	5·4	3·0	6·2	2·2	3·8	6·6	4·2	5·0	5·2	4·8	4·6	4·2	5·4	4·4	3·6	4·2	5·8	4·6	3·4	3·6	6·6	5·2	2·8
Sample No.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
	2	3	2	5	9	1	2	2	9	0	3	9	6	5	6	4	4	2	8	4	1	7	2	8	0
	1	9	8	1	4	3	4	7	6	9	3	4	9	3	5	0	6	3	5	4	1	9	9	6	4
	0	1	2	3	7	1	2	1	2	3	8	1	0	1	4	4	3	1	2	1	0	7	2	3	5
	4	2	4	3	8	1	7	5	7	9	0	7	2	5	2	4	9	7	3	2	0	3	5	8	2
	1	1	0	2	1	6	9	9	2	7	2	5	7	0	1	2	1	7	0	4	4	3	0	9	6
Mean of each sample	1·6	3·2	3·2	2·8	5·8	2·4	4·8	4·8	5·2	5·6	3·2	5·2	4·8	2·8	3·6	2·8	4·6	4·0	3·6	3·0	1·2	5·8	3·6	6·8	3·4

how much the experience of each person deviates from the average, finding the average of the squares of these deviations, and the square root of this value). From that universe we will draw at random samples of 5 individuals. From each sample we can calculate the mean number of attacks suffered by the 5 individuals composing it. To what extent will these means in the small samples diverge from the real mean—i.e., the mean of the universe, 4·50 ?

In Table IV are set out a hundred such samples of 5 individuals drawn at random from the universe.[1] For instance in the first sample there were 3 individuals who had 2 colds each, one fortunate one who had none, and one unfortunate who had 4. From each of these samples a mean can be calculated which, in all, gives one hundred mean values; and of these means we can make a frequency distribution. In the first

TABLE V.—*Mean Number of Colds per Person in Samples of Different Size*

(1) Value of mean in sample.	(2) Samples of 5.	(3) Samples of 10.	(4) Samples of 20.	(5) Samples of 50.
	Frequency with which mean values, as shown in column (1), occurred.			
0·75–	1	—	—	—
1·25–	1	—	—	—
1·75–	4	1	—	—
2·25–	2	2	—	—
2·75–	12	5	2	1
3·25–	15	8	9	5
3·75–	12	16	24	22
4·25–	10 (39)	26 (58)	31 (77)	45 (91)
4·75–	17	16	22	24
5·25–	8	15	10	3
5·75–	6	8	2	—
6·25–	7	3	—	—
6·75–	4	—	—	—
7·25–7·75	1	—	—	—
Total number of means..	100	100	100	100
Total observations	500	1000	2000	5000
Grand mean..	4·43	4·61	4·50	4·48

sample the mean is 2+2+2+0+4÷5=2·0, in the second it is 7·2, and so on. The distribution of the means is given in Table V, column (2). There was one sample in which the mean was only 1·2 and one in which it was as high as 7·4 (the possible minimum and maximum values are, of course, 0 and 9). A study of this distribution shows:

(*a*) That with samples of only 5 individuals there will be, as might be expected, a very wide range in the values of the mean; the mean number of attacks of the whole 500 individuals is 4·43, which is very close to the mean of the universe sampled—namely, 4·50 (as given above)—but in the individual samples of 5 persons the values range from between 0·75 and 1·25 (the one at 1·2) to between 7·25 and 7·75 (the one at 7·4). In samples of 5, therefore, there will be instances, due to the play of chance, in which the observed mean is far removed from the real mean.

(*b*) On the other hand these extreme values of the mean are relatively rare, and a large number of the means in the samples lie fairly close to the mean of the universe (4·50)—39 per cent. of them lie within three-quarters of a unit of it (i.e., between 3·75 and 5·25).

When in place of samples of 5 individuals a hundred samples of 10 individuals were taken at random from this universe, the distribution of the means in these samples showed a somewhat smaller scatter—as is shown in column (3) of Table V. The extreme values obtained now lie in the groups 1·75–2·25 and 6·25–6·75 and 58 per cent. of the values are within three-quarters of a unit of the real mean—i.e., the mean of the universe.

When 100 samples of 20 were taken (column 4) the scatter was still further reduced; the extreme values obtained lay in the groups 2·75–3·25 and 5·75–6·25 and 77 per cent. of the values lay within three-quarters of a unit of the real mean. With samples of 50 (column 5) there were 91 per cent. of the means within this distance of the true mean and 45 per cent. lay in the group 4·25–4·75—i.e., did not differ appreciably from the real mean. Outlying values still appeared, but appeared only infrequently.

TWO FACTORS IN PRECISION

These results show, what is indeed intuitively obvious, that the precision of an average depends, at least in part, upon *the size of the sample*. The larger the random sample we take the more accurately are we likely to reproduce the characteristics of the universe from which it is drawn. The size of the sample, however, is not the only factor which influences the accuracy of the values calculated from it. A little thought will show that they must also depend upon the *variability of the observations in the universe*. If every individual in the universe could only have one value—e.g., in the example above every individual in the universe had exactly 3 colds—then clearly, whatever the size of the sample, the mean value reached would be the same as the true value. If on the other hand the individuals could have values ranging from 0 to 900 instead of from 0 to 9 the means of samples could, and would, have considerably more variability in the former case than in the latter. The accuracy of a value calculated from a sample depends therefore upon two considerations:

(*a*) The size of the sample.

(*b*) The variability within the universe from which the sample is taken.

The statistician's aim is to pass from these simple rules to more precise formulæ, which will enable him to avoid drawing conclusions from differences between means or between proportions when in fact these differences might easily have arisen by chance.

MEASURING VARIABILITY

As a first step we may return to Table V and measure the variability shown by the means in the samples of different sizes. So far we have illustrated that variability by drawing attention to the range of the means, and, roughly, the extent to which they are concentrated round the centre point; a better measure will be the standard deviations of the frequency distributions. The results of these calculations are shown in Table VI.

The standard deviation, or scatter, of the means, round the grand mean of each of the total 100 samples, becomes, as is obvious from the frequency distributions, progressively smaller as the size of the sample increases. It is clear, however, that the standard deviation does not vary *directly* with the size of the sample; for instance, increasing the sample from 5 to 50—i.e., by ten times—does not reduce the scatter of the means by ten times. The scatter is, in fact, reduced not in the ratio of 5 to 50 but of $\sqrt{5}$ to $\sqrt{50}$—i.e., not ten times but 3·16 times (for $\sqrt{5}=2{\cdot}24$ and $\sqrt{50}=7{\cdot}07$ and $7{\cdot}07/2{\cdot}24 = 3{\cdot}16$). This rule is very closely fulfilled by the values of Table VI; the standard deviation for samples of

[1] The "universe" actually used for this and later demonstrations was a publication entitled Random Sampling Numbers arranged by L. H. C. Tippett (Tracts for Computers, No. XV. Camb. Univ. Press, 1927). Sets of unit random numbers were taken from its columns in fives, tens, twenties, and fifties as required.

5 is 1·36, and this value is 3·09 times the standard deviation, 0·44, with samples of 50. The first more precise rule, therefore, is that the accuracy of the mean computed from a sample does not vary directly with the size of the sample but with the square root of the size of the sample. In other words, if the sample is increased a hundredfold the precision of the mean is increased not a hundredfold but tenfold.

TABLE VI.—*Values Computed from the Frequency Distributions of Means given in Table V*

Number of individuals in the sample.	The mean, or average, of the 100 means.	The variability or standard deviation of each 100 means.	The standard deviation of the observations in the population sampled ÷ square root of size of sample.
5	4·43	1·36	1·28
10	4·61	0·91	0·91
20	4·50	0·61	0·64
50	4·48	0·44	0·41

As the next step we may observe how frequently in samples of different sizes means will occur at different distances from the true mean. For instance it was pointed out above that with samples of 5 individuals 39 per cent. of the means lay within three-quarters of a unit of the true mean of the universe. The grand mean of these 100 samples, 4·43, is not quite identical with the true mean of the universe, 4·50, as, of course, the total 500 observations are themselves only a sample; it comes very close to it as the total observations are increased—it is 4·48 with 100 samples of 50. Instead, therefore, of measuring the number lying within three-quarters of a unit, or one unit, of the grand mean (or true mean, taking them to be to all intents and purposes identical), we may see how many lie within the boundary lines "grand mean plus the value of the standard deviation" and "grand mean minus the value of the standard deviation"—i.e., 4·43+1·36=5·79 and 4·43−1·36=3·07. The calculation can be made only approximately from Table V, but it shows that some two-thirds of the means will lie between these limits. If we extend our limits to "grand mean plus *twice* the standard deviation" and "grand mean minus *twice* the standard deviation"—i.e., 4·43+2 (1·36) =7·15 and 4·43−2 (1·36)=1·71—it will be seen that these include nearly all the means of the samples, only about 3 per cent. lying beyond these values (according to theory we expect 5 per cent. beyond ± twice the standard deviation). Roughly the same results will be reached if these methods are applied to the larger samples. Our conclusions are therefore:

(*a*) If we take a series of samples from a universe, then the means of those samples will not all be equal to the true mean of the universe but will be scattered around it.

(*b*) We can measure that scatter by the standard deviation shown by the means of the samples; means differing from the true mean by more than twice this standard deviation, above or below the true mean, will be only infrequently observed.

DEDUCING THE STANDARD DEVIATION

In practice, however, we do not know this standard deviation of the means, for we do not usually take repeated samples. We take a single sample, say of patients with diabetes, and we calculate a single mean, say of their body-weight. Our problem is this: how precise is that mean—i.e., how much would it be likely to vary if we did take another, equally random, sample of patients? What *would* be the standard deviation of the means if we took repeated samples? It can be shown that the standard deviation of means of samples is equal to *the standard deviation of the individuals in the population sampled* divided by the square root of the number of individuals included in the sample (usually written as $\sigma/\sqrt{n}$). These values have been added to Table VI (right-hand column) and it will be seen that they agree very closely with the standard deviations calculated from the 100 means themselves (they do not agree exactly because 100 samples are insufficient in number to give complete accuracy). With this knowledge we can conclude as follows: the mean of the universe is 4·50 and the standard deviation of the individuals within it is 2·87 (see above); if we take a large number of random samples composed of 5 persons from that universe, the means we shall observe will be grouped round 4·50 with a standard deviation of $2{\cdot}87/\sqrt{5}$; means that differ from the true mean, 4·50, by as much as plus or minus twice $2{\cdot}87/\sqrt{5}$ will be rare. If we take a large number of samples of 50 then the means we shall observe will be grouped around 4·50 with a standard deviation of $2{\cdot}87/\sqrt{50}$, and means that differ from 4·50 by as much as plus or minus twice $2{\cdot}87/\sqrt{50}$ will be rare.

The final step is the application of this knowledge to the single mean we observe in practice. In the previous section the mean systolic blood pressure of 566 males (drawn from the area in and around Glasgow) was given as 128·8 mm. We want to determine the precision of this mean—i.e., how closely it gives the true mean blood pressure of males in this district.

Suppose that the true mean is x. Then from the reasoning developed above we know that the mean of a sample may well differ from that true mean by as much as twice $\sigma/\sqrt{n}$, where σ is the standard deviation of the blood pressures of individuals *in the universe* from which the sample was taken and n is the number of individuals in the sample; it is not likely to differ by more than that amount—i.e., our observed mean is likely to lie within the range $x \pm 2(\sigma/\sqrt{n})$. Clearly, however, we do not know the value of σ and as an estimate of it we must use the standard deviation of the values in our sample. It must be observed that this *is* only an estimate, for just as the mean varies from sample to sample so also will the standard deviation. But the latter varies to a slighter extent and so long as the sample is fairly large the estimate is a reasonable one, and unlikely to lead to any serious error. In the example cited the standard deviation of the 566 measures of systolic blood pressure was 13·05. We, therefore, estimate that the standard deviation of *means* in samples of 566 would be $13{\cdot}05/\sqrt{566} = 0{\cdot}55$.

We may conclude (presuming that the sample is a random one) that our observed mean may differ from the true mean by as much as ± 2 (0·55) but is unlikely to differ from it by more than that amount. In other words the true mean is likely to lie within the limits of 128·8 ± 2 (0·55) or between 127·7 and 129·9, for if it lay beyond these points we should be unlikely to reach a value of 128·8 in the sample.

The ± value is known as the *standard error* of the mean and is used as a measure of its precision. The estimation is clearly inapplicable if the sample is very small, for the substitution of the standard deviation of the few observations in the sample in place of the standard deviation of the whole universe, from which the few observations were taken, may be a serious error. With small samples different methods must be applied.

Sometimes in published work *probable errors* are given in place of standard errors. The former (which has no advantage over the latter) is merely the standard error multiplied by 0·6745. If the variability likely to be observed is ± twice the standard error it will clearly be ± thrice the probable error, for the latter is, approximately, only two-thirds of the former.

The origin of the factor 0·6745 is this. We previously calculated the number of means of samples that lay within the limits "grand mean plus once the standard deviation" and "grand mean minus once the standard deviation." If, instead, we calculated the number of means that lay within the limits "grand mean plus 0·6745 times the standard deviation" and "grand mean minus 0·6745 times the standard deviation" we should expect to find that precisely half the means lay within these limits and half lay outside them. If, therefore, we took a single sample it would be an even chance that its mean did not differ from the real mean by more than 0·6745 times the standard deviation.

Summary

In medical statistical work we are, nearly always, using samples of observations taken from large populations. The values calculated from these samples will be subject to the laws of chance—e.g., the means, standard deviations, and proportions will vary from sample to sample. It follows that arguments based upon the values of a single sample must take into account the inherent variability of these values. It is idle to generalise from a sample value if this value is likely to differ materially from the true value in the population sampled. To determine how far a sample value is likely to differ from the true value a standard error of the sample value is calculated. The standard error of a mean is dependent upon two factors—viz., the size of the sample, or number of individuals included in it, and the variability of the measurements in the individuals in the universe from which the sample is taken. This standard error is estimated by dividing the standard deviation of the individuals in the sample by the square root of the number of individuals in the sample. The mean of the population from which the sample is taken is unlikely to differ from the value found in the sample by more than plus or minus twice this standard error. This estimation is, however, not applicable to very small samples, of, say, less than 20–30 individuals, and must be interpreted with reasonable caution in samples of less than 100 individuals.

A. B. H.

SPECIAL ARTICLES

THE NEW RESEARCH LABORATORIES AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

ON Monday last the Hunterian Museum in Lincoln's Inn was closed for an indefinite period (perhaps till the middle of March) in order to expedite the building of laboratories, which has just begun, to house the scientific staff and research workers of the Royal College. The reasons which prompted the Bernhard Baron trustees to make their gift of £25,000 last May were the difficult conditions under which work was then being carried out, and the conviction that better accommodation for research work would lead to an increase in medical and surgical knowledge. Work is to be pushed forward with all possible speed and it is hoped to have the Bernhard Baron laboratories ready for occupation in the coming autumn. The scheme consists in the demolition and remodelling of the internal structure of the floors above the level of the College library and the erection of two towers (shown on the elevation reproduced in Fig. 1), one at each end of the existing fourth and fifth floors. The roof will be removed and re-erected in such a way that additional laboratory space will be provided on the sixth floor. Plans of these three floors as they will be when finished are given in Fig. 2.

SIXTH FLOOR

Commencing on the east side will be found the animal room, sufficient for the accommodation of experimental animals necessary for research work. This room is not as large as might be expected in laboratories of this size for the simple reason that stocks of experimental animals and animals recovering from operations are ordinarily housed at the Buckston Browne surgical research farm at Downe. The animal room will be finished in white tiles and will have one wall, made of glass and steel, which can be opened completely in summer weather. It faces south and is adequately ventilated by roof lights. The animal kitchen, food store, and cage sterilising room are in a corridor immediately outside the animal room. In the food store provision is made for refrigeration and bin storage of bulk foods. The cage sterilising room has a vat sufficiently large to contain and sterilise the largest cage in use. A staff kitchen is situated immediately outside the common room set apart for the use of members of the scientific staff and research workers. This room provides a central place where workers can discuss their problems and meet those interested. On the southern aspect of this room is a sliding folding window, 16 feet in length, capable of being thrown open during the summer. There will be an open fire and book-shelves

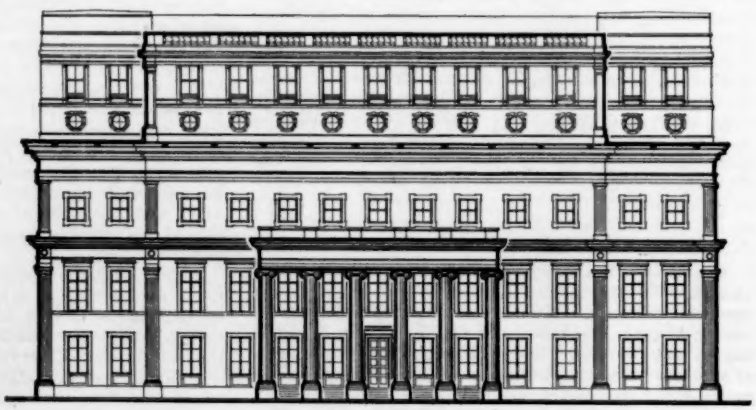


FIG. 1.—Front elevation of the College showing the new laboratories. The heavy outline encloses the original building.

for current periodicals. Three small specimen laboratories are for isolated organ experiments and biochemical work; then comes the balance and colorimeter room and a small study for the worker who wishes privacy while reading or writing up a piece of work.

FIFTH FLOOR

Beginning at the east end is the histological laboratory and a room for the assistant conservator. The operating suite comprises theatre with adjacent sterilising room, opposite to which on the other side of the corridor is the changing room, complete with shower-bath and clothes cupboards. The theatre will be tiled with terrazzo flooring. To eliminate danger of fire and anæsthetic explosions, all electrical switch gear in these rooms will be of mercury and enclosed. Compressed air and vacuum services are available for the anæsthetist and operator. Next the sterilising room is the main autoclave and water sterilising plant, the room also being used for the preparation of laboratory solutions, sterilising of dressings, &c. On the other side of the corridor is a large acute experimental laboratory fitted with kymographs and physiological equipment. Adjoining is a room for the smoking and varnishing of drums. The workshop for metal and wood-working is a necessary provision when large amounts of apparatus are in use. The director's laboratory will contain a completely electro-magnetically screened cubicle to house the cathode ray oscillograph equipment. Alongside is his private room. Another large experimental laboratory completes this floor.

FOURTH FLOOR

On this floor is housed the scientific staff of the museum with ample storage space. The large east room is for the mounting and articulating of pathological and anatomical specimens. The pathological curator's room communicates with the laboratory, where all the pathological work will be done. The anatomical laboratory is for use in the preparation of dissections. The X ray unit is in a separate room out of which opens the dark room. The floor is completed by the cataloguing room and a room for the museum secretaries.

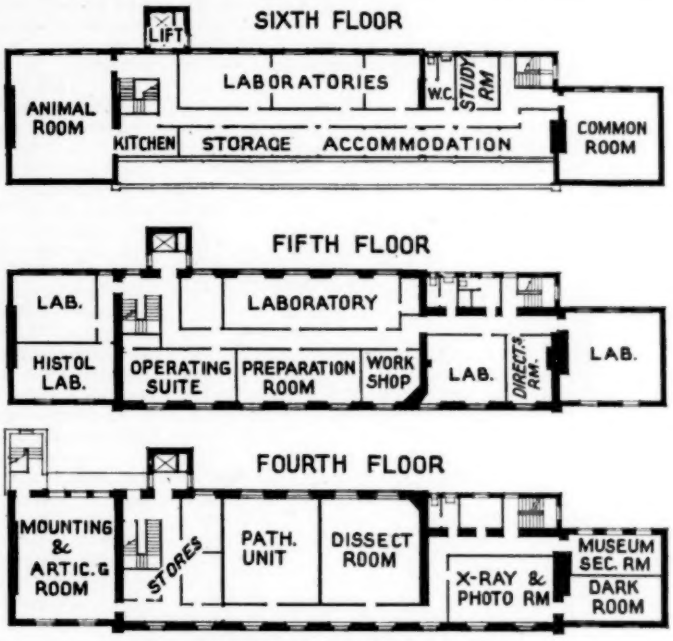


FIG. 2.—Plans of the three new floors.

The Equipment

An outstanding feature of the new laboratories is the method whereby plasticity of arrangement has been obtained. The furniture—benches, cupboards, drawers—is built in standard units which can easily be moved and refixed where necessary. Apparatus can be placed in the most suitable position and the whole contents of a room rearranged. The only fixed points are the sinks. Electric light, gas, vacuum, and compressed air points are arranged on the walls in convenient positions, and in the large laboratories trap doors in the floor allow of access to electric, gas, and water points, so that experiments, if necessary, can be arranged and carried out well away from the surrounding walls. With the exception of the animal rooms, operating and sterilising rooms, the new floors are laid throughout in Queensland jarrah wood strips, and partition walls are built of expanded metal and plaster. Rearrangement of rooms would therefore be a simple matter should it become necessary. The X ray equipment will serve cineradiography as well as the routine X ray investigations. The main characteristics of the design and equipment have been utility and simplicity.

Structural alterations to the main College building are required to carry the increased weight of the laboratories, but when the scheme is finished these will not be apparent. The external appearance will in fact be improved by the new towers which bring the building back again to the original double cube design of Sir Charles Barry, who was the first architect of the present structure. Barry's original block was a perfect double cube, and the new building closely approximates to these proportions.

The architects are Messrs. Lanchester and Lodge, and the contractors Messrs. Higgs and Hill.

MEDICINE AND THE LAW

Damages against Nature Cure Practitioner

ON the fifth day of the trial in the case of Sones *v.* Foster, the jury awarded the plaintiff £490 damages for the negligence of the defendant, a nature cure practitioner. Mr. Sones, a man aged about 59, suffered in August, 1935, from a gangrenous left foot, the condition being due to sepsis following a corn. He consulted Mr. Foster on August 17th and was advised that frequent treatments would be necessary. For this reason he went to Mr. Foster's house for several weeks at a charge of 8 guineas a week. According to Mr. Sones the treatment included painful scrubbing with a nail-brush, the cutting away of skin, the immersion of the foot in almost boiling water, and the snipping off of a toe. Mr. Foster, on the other hand, said that he devoted himself to improving the patient's general health (which was very bad) so as to prepare him for the operation of removing his foot, which he never had any hope of

saving. After 9 weeks in Mr. Foster's house the plaintiff was taken, on Oct. 22nd, to St. Bartholomew's Hospital where his leg was amputated above the knee next day. There was considerable dispute as to the exact state of Mr. Sones when Mr. Foster first saw him, as to the degree of progress made by the patient in Mr. Foster's house, and as to the assurances of improvement which Mr. Foster was alleged to have given to his patient. As the trial proceeded, it seemed that the issue would be whether or not, through Mr. Foster's fault, operation had been delayed with the result that Mr. Sones's leg was amputated above the knee instead of below the knee. This was perhaps an awkward surgical problem for Mr. Foster, whose qualifications were membership of the British Association of Naturopaths, membership of the Association of Medical Herbalists, and membership of the Health Practitioners' Association. The experts called on behalf of Mr. Foster included Mr. Arthur Barker, a herbal practitioner, who, having heard Mr. Foster's description of his treatment, deemed it correct, and Dr. J. A. C. Braun, who said he had removed his name from the Medical Register in 1935 in order that he might be free to write and lecture as he pleased. Dr. Braun's evidence was that it was in any case preferable to amputate the patient's leg above the knee even if the surgeon felt he could safely take the leg off below. A man did not always have better movement if his knee was saved than if he lost it; if amputation was in any case necessary just below the knee, amputation above the knee had every advantage; the condition of arterio-sclerosis confirmed his view. During discussions between Mr. Justice Atkinson and the counsel in the case, it seems to have been agreed that a naturopath is not expected to show any higher degree of skill than similar practitioners profess, but that, if he steps out of his vocation and undertakes treatment when he knows he can do no good, then he is liable. The jury seems to have found that Mr. Foster represented himself to be a naturopath of a high order, and that, judged by that standard, he had been guilty of negligence in the advice and treatment which he gave to Mr. Sones. The sum of £490 which their verdict awarded was made up of £40 for the return of fees which the plaintiff had paid, £50 for unnecessary pain suffered by him, and £400 for the loss of his knee.

Visitors to courts of law are sometimes intrigued by exhibitions of judicial nescience. A judge is allowed to know the points of the compass and the daily rising and setting of the sun. Counsel must be careful not to take too much else for granted; many matters of common knowledge must be strictly proved and not merely assumed. Mr. Justice Atkinson, in summing up to the jury, refrained from taking shelter behind the walls of judicial ignorance. Although, he said, the orthodox medical profession liked to think itself the sole repository of knowledge connected with the healing art, there were undoubtedly unorthodox practitioners rendering great public service; professional osteopaths and naturopaths were an example. The present-day appreciation of the benefits of fasting was due to the naturopaths; it was wrong to disparage these practitioners; nobody need consult them unless he liked. The learned judge mentioned the statute of 34 & 35 Henry VIII, still unrepealed, which is sometimes called the Herbalists' Charter, though the preamble hints that the non-academic practitioners thereby to be protected are those who have ministered to poor people "only for neighbourhood and God's sake and of pity and charity." If the law has stood still since the statute was passed, medicine and surgery have made some modest progress in the meanwhile. If courts are anxious to delve into the archæology of statutory references to medicine, there is another Act of Henry VIII (also still unrepealed) which expresses concern because "common artificers, as smiths, weavers and women, boldly and accustomably take upon them great cures . . . to the grievous hurt, damage and destruction of the King's liege people and especially of them that cannot discern the cunning from the uncunning." In Sones *v.* Foster the plaintiff's counsel probably did not omit to point out that Mr. Foster had undertaken a surgeon's task with a herbalist's qualifications. The judge may on this account have felt the stronger impulse to defend unorthodox practitioners; he has to see fair play. As for distinguishing the cunning from the uncunning or, as the Medical Act puts it, the qualified from the unqualified, there was a suggestion that Mr. Foster had unjustifiably represented himself to be a fully qualified doctor. As this allegation did not specifically appear upon the plaintiff's pleadings, the court refused to allow evidence to be given on the point. Mr. Foster agreed, in cross-examination, that he was not entitled to use the letters "M.D." A circular whereon his signature was followed by the letters "M.D.S.F." was put to him. He explained that the initials stood for Member of the Democratic Socialist Federation; it was a printer's error that there was a gap between the "M.D." and the "S.F."; the circular was destroyed on that account. Questioned about documents referring to an agreement with a gas company, he admitted that the words "medical practitioner," describing him, were in his own handwriting. But when pressed about the letters "M.D." which followed his signature to the agreement, he insisted that they were "N.D." and not "M.D."; the "N.D." stood for Diploma in Nature Cure. Well, it is all very confusing.

Ambulance Service and Hospital Rules

At a recent inquest in Plymouth, where the deceased had been injured in a traffic accident, it was stated that a new rule had been made locally to the effect that on particular days of the week the traffic casualties should (except in serious cases) be taken to particular hospitals. It was said that, though this rule had been in force since Jan. 1st, neither the police nor the ambulance drivers concerned were aware of it. The ambulance took the injured man to the Prince of Wales's Hospital, Devonport, in accordance with the usual orders to take the cases to the nearest hospital. Arriving at the Devonport Hospital at 6.19 P.M., the ambulance driver was told that already one accident case was being dealt with in the casualty ward and that the injured man should have been taken somewhere else. While waiting in the emergency waiting-room, the patient was kept warm and a fresh dressing was applied. At 7.38 he was taken to the Lockyer-street Hospital where an injection was given. He had a fractured leg and a cut eyelid and was suffering from shock. He died when about to undergo operation. The coroner naturally sought to ascertain whether there had been any failing to treat the man as a serious case on his arrival at Devonport and whether death was accelerated by the removal on the second journey in the ambulance. Post-mortem examination showed that the patient, aged 68, had a weak heart and might have died at any time. A verdict was returned that death was due to shock; no blame was attributed to any-

(*Continued at foot of next page*)

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index.

FROM A PUBLIC HEALTH CLINICIAN

V

KINGS may change but public devotion to the Crown remains largely unchanged; similarly the relations of the public to their doctors do not alter materially from year to year. In most respects the public obtain from their doctors what they wish. They demand medicines and medicines they get. Should any doctor see a patient and advise ever so wisely, but not prescribe a medicine, patient and friends will be dissatisfied and declare that nothing has been done. If a doctor fails to prescribe for his own family it is likely they will seek some tasty or prettily coloured mixture from the local chemist. There are indeed a few medicines which have a definite influence on the disease for which they are given and others which may assist a patient to recover more comfortably, but the majority, alas, are of little value. Doctors are not magicians or even prophets but just pilots who guide their patients through maladies. The doctor merely steers, the patient does the curing.

Again the public demand names and causes for their illnesses, and names and causes they get. Each day any of us may experience a pang of pain or a discomfort somewhere and it is generally impossible to say exactly why it occurs or to what defect the discomfort is due. The position is different with a declared disease, but those that consult their doctors for less defined ailments nevertheless demand names and a cause. Various terms or phrases have been adopted which satisfy the patient. A great favourite is chill; a thorough chill, chill of liver, stomach, kidney, heart, or nerves. Now illness due to chilling may occur and pains may well follow exposure to draught, as those in the neck or back after a motor drive, or due to some exposure during the night in a cold bedroom, but the word chill is used in addition to cover a host of undiagnosable minor ailments. Rheumatism is popular, and neuritis, and last, but not least, comes influenza to cover a variety of conditions, especially febrile attacks due to infection with a known or unknown germ.

It may be said that doctors prescribe unnecessary medicines or that one has wrongly diagnosed as "neuritis" something which a colleague distinctly said was a "chill"; but let patients remember that these mischances happen because they demand medicines and names.

Fashions in treatment come and go; bleeding is succeeded by polypharmacy which in turn gives way to dietetics. Fashions in diagnosis also change, suppressed gout we no longer hear of, visceroptosis has almost passed and even colitis of various kinds has become less common. There are also ætiological fashions. In the Victorian era excessive smoking was a common cause to which ills were attributed, but now that excessive smoking is far commoner we hear much less of this factor, maybe because the doctors are among the worst sinners. Except for tobacco amblyopia and cancer of the tongue there are few disabilities that can rightly be attributed to this excess. There are those who would attribute duodenal ulcer to this cause and perhaps they are right; the case does not yet seem proven, but to depend mainly on the obiter dicta of great men—a very dangerous basis. For those who would attribute thrombo-angitis obliterans to tobacco smoking I feel little sympathy. To prove that a very rare disease is due to a very common habit necessitates remarkably sound arguments; the case to-day is even more shadowy than Karl Pearson's statistical suggestion that the decline in tuberculosis was due to the increase in the British Navy. The victimisation of the large intestine for alleged metabolic misdeeds was perhaps merely a personal albeit a dangerous idiosyncrasy, but even constipation to-day has lost its quondam popularity. No doubt the pendulum will swing again.

Perhaps we are all too ready to accept plausible ætiological explanations, as are botanists or ornithologists ready to accept somewhat fanciful, if not poetical, suggestions as the reason for the existence of structural features. The cessation of the dread summer diarrhœa has been attributed to the extension of pasteurisation of milk, but yet the disease has slackened or ceased in districts where there is no pasteurisation. A bright colleague suggested to me that diarrhœa and possibly some other disabilities had gone as the horses on the roads became fewer; that may indeed be a factor, but I would give a more prominent place to the extension of road tarring which also has perhaps diminished summer epidemics of septic sore-throat.

It would be interesting if this question of ætiology were considered from a different angle. Instead of seeking to explain certain morbid happenings someone with the time to spare might review the changes that have taken place in our environment and habits—such as road tarring or motoring—and work out what results may be reasonably related thereto.

* * *

The science of meteorology covers a wide field. Most of us are aware of the activities of meteorologists only as made known through weather reports and from the shrewd prophecies heard on the air. Some doctors may tap barometers, or even keep rain gauges, but they are for the most part entirely unfamiliar with the formation and movements of clouds or even the method of judging the velocity of air currents by the movement of small, medium, or large trees. Into the activities of the meteorological society I received a baptism when in a rash moment I promised to act as phenological observer for district

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body. Medical witnesses said that it was a pity that he was not kept at Devonport for treatment, but that the delay in treatment did no harm. There were two doctors at the hospital, one on duty. A case of this kind would have needed two doctors and, if the patient had been admitted, it would have been necessary to keep him warm and quiet for some time before the operation in any event. The coroner accepted this evidence but rightly thought any change in the rules for admitting traffic casualties should be made fully known to the police and the ambulance service.

A 50. First appearances had to be reported of a large number of plants, migrant birds, butterflies, and insects, to say nothing of frog spawn and the first songs of certain birds. It seemed an interesting pastime and I attempted to organise the district through schools and natural history societies as well as keeping all agog my own eyes and ears. The result was satisfactory but the duties were too onerous, the task far too great for any busy man, and I abandoned the work after a year with a feeling of relief; a great weight was lifted—it was as if some miraculous message had been received from the commissioners for the Inland Revenue that they would forgo my income-tax for 1937. No longer was it necessary to keep one eye constantly on the calendar and the other glued to hedges, fields, woods, marshes, and ponds.

Yet the preoccupation carried the compensation that it led me along various meteorological highways and by-ways that would never otherwise have been traversed. Like many others I bemoan a failing memory and the lack of time and capacity to explore many enchanting fields.

* * *

The art of chairmanship and the art of being a secretary are both useful to doctors in their many-sided duties. Having been chairman or secretary of various bodies, councils, or committees for over 40 years and having made, in one or other capacity, most of the mistakes that it is possible to make, the rudiments of the art are now becoming familiar to me, and I have come to realise that good chairmen and good secretaries are born rather than made. But, granted a certain innate flair for the work, unceasing education is still necessary if excellence is to be achieved or maintained. (And, in parentheses, though some may not agree, I believe the art of letter writing takes a deal of learning.)

Certain principles must guide both chairman and secretary; they must be prepared to let others reap the credit for their own ideas and they must avoid sharp retorts. The caustic remark, the acid retort, so easy to make (we see them in all the comic papers), yet so difficult to recall, are prone to transport a discussion from the plane of reason to that of emotion. Yet chairman or secretary must be prepared to be firm and to reach swift and equitable decisions. There are no rigid rules, although there may be relatively rigid rules. Some meetings are best guided by permitting heterogeneous speeches, others by keeping everyone strictly to the point. A word or two of explanation or a smile will often maintain better control than blows with the chairman's mallet. Much have I learnt and much am I still learning from individual tacticians following their individual tactics. One able man, wishful to put through difficult and disputed decisions, would begin straight away by quarrelling and making libellous remarks until angry words were bandied and faces became redder; then came a reaction, everyone regretted their excesses, time was passing, and all the controversial matters were decided amicably and according to the wishes of the quarrelsome diplomat. Lord Askwith seemed to give everyone a free hand to talk as much as they liked and about anything they wished; yet at crucial points, when the right atmosphere had been secured, he was always a tower of strength.

But this is not an essay on chairmanship and I must hand on the torch of "Grains and Scruples" to my anonymous, but certainly worthy, successor.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdrs. J. C. Brown to *Drake*, for R.N.B.; and J. C. Souter to *President*, for Medical Dept., Admiralty.

Surg. Lt.-Comdrs. C. H. Egan to *Pembroke*, for R.N.B.; and D. F. Walsh to *Ganges*.

Surg. Comdrs. (D) C. J. Finnigan to *Tamar*, for R.N. Hosp., Hong-Kong; T. Hunt to *Drake*, for R.N. Hosp., Plymouth; A. T. Dally to *Ganges*; and A. Macpherson to *Victory*, for R.N.B.

Surg. Lt.-Comdrs. (D) D. Barker to *Victory*, for R.N. Hosp., Haslar; L. R. Armstrong to *Defiance*; and H. R. Rose to *Pembroke*, for Sheerness T.E.

Surg. Lt. (D) H. C. Benson to be Surg. Lt.-Comdr. (D).

Surg. Lts. I. C. Macdonald to *Nelson*; W. H. C. M. Hamilton to R.N. Hosp., Haslar; and B. M. O'Sullivan to *Eagle*.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lt. J. F. Heggie promoted to Surg. Lt.-Comdr.

Surg. Lt. (D) J. Bunyan to *Pembroke*, for R.N.B.

ROYAL ARMY MEDICAL CORPS

Capt. F. McL. Richardson to be Maj. Oct. 1st, 1936 (substituted for notification in *Gazette*, Oct. 13th, *vide* THE LANCET, Oct. 24th, p. 1009).

Short Service Commissions: Lt. (on prob.) J. A. V. Nicoll is secd. under the provisions of Art. 213, Royal Warrant for Pay and Promotion, 1931.

TERRITORIAL ARMY

Col. R. Jackson, T.D., vacates the appt. of Hon. Col. R.A.M.C. Units, 55th (W. Lan.) Div., T.A., on completion of tenure.

Col. J. G. Martin, T.D. (ret.), to be Hon. Col. R.A.M.C. Units, 55th (W. Lan.) Div., T.A.

Lt. J. C. H. Speirs to be Capt.

Lt. G. O. Montgomery, late T.A. Res. of Off., to be Lt.

TERRITORIAL ARMY RESERVE OF OFFICERS

Capt. J. B. Fulton, from Active List, to be Capt.

ROYAL AIR FORCE

Flying Offr. R. F. Wynroe is promoted to the rank of Flight Lt.

Flying Offr. W. J. Mitchell resigns his short service commission.

Flying Offr. D. G. Smith to No. 3 Armament Training Camp, Sutton Bridge.

AUXILIARY AIR FORCE

Flight Lt. H. W. Walter relinquishes his commission on completion of service and is granted a commission as Flight Lt. in class D, A.A.F. Reserve of Officers.

INDIAN MEDICAL SERVICE

Maj. H. Williamson, O.B.E., to be Lt.-Col.

NEW SCHEME AT FROME VICTORIA HOSPITAL.—Since this hospital was built in 1900 there has been a scheme by which members contributed first a halfpenny and then a penny a week. As this is now quite inadequate, a new scheme has been evolved by which married men pay 3*d.* a week to cover husband, wife, and children under 16 who are not employed; young people between 16 and 18 pay 1*d.* a week; and single adults 2*d.* The scheme covers treatment at several hospitals.

WEST SUFFOLK AND IPSWICH HOSPITAL.—Sir Bunnell Burton, of Ipswich, and Sir William Churchman, of Melton, have agreed to share between them the cost of building an orthopædic department and fracture clinic at this hospital. The cost is estimated at £6000. Recent extensions and modernisations had absorbed all available funds, and the hospital board was committed to the orthopædic scheme by arrangement with the local authorities.

CORRESPONDENCE

THE WILL OF THE LATE SIR HENRY WELLCOME

To the Editor of THE LANCET

SIR,—As the trustees appointed by the will of the late Sir Henry Wellcome, we ask you to be good enough to publish this letter, in order to clear up any misconception which may have arisen with regard to the effects of the will. We are led to make this statement by the number of appeals for contributions to various research undertakings which have already reached us. For reasons mentioned below the trustees will not be able to consider any such applications in the immediate future.

In January, 1924, the Wellcome Foundation Limited was formed for the purpose of taking over the whole of the business activities of Burroughs Wellcome and Co., and the various scientific research institutions and museums established by the late Sir Henry Wellcome who held the whole of the share capital.

By the terms of the will the shares of the Wellcome Foundation are now vested in us as trustees and the activities of the Foundation throughout the world will be carried on, in collaboration with the trustees, by a board of directors of which the present governing director is Mr. George E. Pearson, who has been closely associated with the late Sir Henry Wellcome for more than 40 years.

It will be realised that owing to the magnitude of the testator's estate a very large sum has to be found for death duties. Provision has also to be made for :—

(*a*) A Welfare Fund for the benefit of employees of the Wellcome Foundation Ltd. and its associated companies.

(*b*) The payment of certain specified annuities to relatives and others personally connected with the testator.

(*c*) The erection and maintenance of a building in Minnesota to be dedicated as a memorial to the testator's parents.

Subject to these prior charges the remainder of the divisible profits will be utilised in accordance with the testator's instructions in the following manner :—

(1) For the maintenance of "The Research Undertaking Charity" which is a fund for the advancement of medical and scientific research work in any part of the world conducive to the improvement of the physical conditions of mankind, and in particular for the discovery, invention, and improvement of medicinal agents and methods for the prevention and cure of disorders, and the control or extermination of insect and other pests which afflict human beings and animal and plant life, and also for the organisation, equipment and expense of special research expeditions and commissions.

(2) For the maintenance of "The Museum and Library Charity" which is a fund for the establishment or endowment of research museums or libraries in any part of the world and for the collection of information of every kind connected with the history of medicine, surgery, chemistry, bacteriology, pharmacy and allied sciences which in the opinion of the trustees may be desirable.

This statement of the position has been somewhat delayed by the fact that the testator imposed upon all his trustees the obligation, before undertaking the trust, to enter into a covenant not to be engaged in or in any way to assist in any concern which carried on a business in competition with Burroughs Wellcome and Co. Three of the trustees had no difficulty in entering into this covenant immediately after the testator's death, but the two medical and scientific trustees felt that certain words in the covenant might be held to restrict them unduly in the performance of their official and general duties to medical science and to imply their particular concern with the business interests of the foundation. The matter has now been considered by the High Court of Justice which has made an order allowing them to enter into a covenant in a form removing any such unacceptable implication and enabling effect to be given to what was known to have been the testator's intention.

No trustee, director, or any other person holds for himself or in his own right any shares in the Wellcome Foundation and all the divisible profits in each year will be devoted to the various purposes named in the will and indicated above.

We believe this to be the first example, in this country at least, of a testamentary disposition by which the whole of the profits from a great manufacturing and trading organisation, after certain personal and memorial bequests have been fulfilled, are permanently dedicated to the advancement of knowledge for the general benefit of mankind.

We are, Sir, yours faithfully,

G. HUDSON LYALL,
H. H. DALE,
L. C. BULLOCK,
MARTIN PRICE,
T. R. ELLIOTT.

Jan. 28th.

PROVISO WHICH, BY ORDER OF THE COURT, MAY BE ADDED BY A TRUSTEE TO THE COVENANT REQUIRED OF ALL THE TRUSTEES UNDER THE WILL OF SIR HENRY WELLCOME.

"PROVIDED that nothing in this Covenant shall be held to prevent me in the exercise of my proper function in any appointment held by me in the public service or under any publicly or privately endowed organisation for the promotion of medical research or under any University in Great Britain from giving advice on scientific matters to any person or persons solely for the purpose of rendering scientific discovery available for the general use and without pecuniary reward or other personal advantage to myself."

INTRADERMAL TESTS IN WHOOPING-COUGH

To the Editor of THE LANCET

SIR,—In your issue of Jan. 15th Dr. B. O'Brien and Dr. J. P. J. Paton both record experience with intradermal tests in whooping-cough. Whereas Dr. Paton has had equivocal results, Dr. O'Brien appears to have obtained some correlation between the positive response and a previous history of whooping-cough.

About a year ago I carried out some intradermal tests and adopted the technique described by Paterson, Bailey, and Waller,[1] using 0·1 c.cm. of the Sauer vaccine supplied by Eli Lilly and Co., Ltd. Readings were taken at 24 and 48 hours. The maximum was usually at 24 hours, but occasionally the 48-hour reading was greater. I have analysed the results according to the standard of Drs. O'Brien and Paton—i.e., assuming a reaction of 1 cm. or more to be positive.

Of 75 children suffering from whooping-cough, at stages varying from the first week to the third month, 49 (65·4 per cent.) were positive—a result similar to Dr. Paton's. I have divided the cases according to whether the test was done in the first three weeks or

[1] Paterson, D., Bailey, R. H., and Waller, R. G. (1935) *Lancet*, **2**, 361.

later, and as the following Table shows, there does appear to be a significant increase in the proportion of positive reactions in the later stages.

Period of disease.	Positive.	Negative.
1st–3rd week	17	17
4th week or later ..	32	9
	49	26

It is doubtful whether this increased sensitivity to the vaccine in the later stages of whooping-cough is permanent, for in a control series I could not demonstrate any correlation between the positive response and a previous history of the disease.

The controls were 75 children convalescent from other infections; 51 (66·2 per cent.) were positive. Grouped according to whether or not they had had whooping-cough, there was no significant difference in the proportion of positive reactions:—

Previous history.	Positive.	Negative.
Whooping-cough ..	18	9
No whooping-cough ..	33	14
	51	23

Generally reactions were of a nondescript type compared with the clear-cut responses to the Schick and Dick tests, and difficulty was found in interpreting them. In many cases there was a small papule of 5 mm. or a faint erythema of 5 to 10 mm.—both responses arbitrarily classed as negative. I do not think one can dismiss such reactions under 10 mm. as being due to trauma of the needle. In other intradermal tests such as the Schick and Dick, it is often difficult to detect even the needle puncture at 24 hours in a negative result, and this applies to young children as well as to adults.

Dr. O'Brien discusses the possible fallacy of the reaction to the Sauer vaccine occurring in a person sensitive to other members of the hæmophilus group. A certain number of the cases I have quoted were controlled by using a vaccine of *H. influenzæ*. Dr. E. A. Straker of the London School of Hygiene kindly supplied me with a freshly isolated strain, which was made up in the same strength as the Sauer vaccine. Reactions from 0·1 c.cm. intradermally were of a type similar to the pertussis reaction, but always greater, the average diameter being 20–30 mm. instead of 10–20. The maximum was at 24 hours, fading at 48 hours. Of the cases of whooping-cough 33 were tested with *H. influenzæ* vaccine, and all but 3 were positive. The 3 that were negative were also negative to the Sauer vaccine. Of the 17 controls tested all were positive. The fact that such reactions were obtained fails to rule out the possibility of there being a group sensitivity to the hæmophilus organisms.

It is not surprising that variable results have been reported with these intradermal tests, considering that a vaccine is used containing the whole products of the organism—stable or otherwise. Elucidation of the antigenic structure of the Bordet-Gengou bacillus may reveal in time some product suitable for clinical use, but at present no reliable agent appears to be available.

I am, Sir, yours faithfully,

Farncombe, Surrey, Jan. 23rd. J. S. WESTWATER.

TUBERCULOUS ABDOMINAL GLANDS

To the Editor of THE LANCET

SIR,—With reference to the interesting article by Mr. Colt and Mr. Clark in your issue of Jan. 16th on tuberculous disease of the abdominal lymphatic glands, I venture some comments, based on 45 patients admitted to this sanatorium with symptoms, and an undetermined number admitted without symptoms but with tuberculosis of the skeletal system in whom calcified abdominal glands were found by radiography. As a result of this experience I have gained an impression, which I have not corroborated, that many cases of tuberculosis of the abdominal glands are not diagnosed and give no other evidence of their presence than a positive tuberculin reaction, and that the cases with symptoms or signs form the minority. Nevertheless the presence of tuberculous abdominal glands is often suspected and, if the suspicion is sufficiently strong, my own feeling is that laparotomy is indicated for the purpose of diagnosis rather than for the purpose of treatment. A positive diagnosis, supported by pathological examination of a removed gland, affords justification for a course of treatment in an open-air hospital to produce quiescence of the disease and to avoid the complications mentioned in Mr. Colt's and Mr. Clark's article. A negative diagnosis will relieve the patient and relatives from the burden of suspicion.

The question of operative removal of tuberculous abdominal glands should therefore not arise, as it is a fact, difficult to explain but accepted by those who work in open-air hospitals, that an efficient régime of rest in the open air, suitable diet, and light treatment will produce in these cases rapid abatement of symptoms and signs, and progress to recovery free from complications. Of the above patients the progress of only one was unsatisfactory, and in her case an additional diagnosis was made of tuberculosis of the cæcum.—I am, Sir, yours faithfully,

M. C. WILKINSON,
Medical Superintendent, Essex County Council Sanatorium, Black Notley.

Jan. 25th.

LYMPHATIC SPREAD IN RECTAL CANCER

To the Editor of THE LANCET

SIR,—As the author responsible for revising the chapter on diseases of the rectum in Rowlands and Turner's "Operations of Surgery," I cannot agree with your reviewer's dismissal of the section on lymphatic spread in cancer of the rectum (THE LANCET, Jan. 23rd, p. 209). The "many years' old diagram" is Miles', and it represents his view to-day; "modern research" is discussed at considerable length on the opposite page. If I could accept the simple creed that everything new is right and everything old is wrong, my work would be easy. But since against the statement that "when a growth in this situation is removable, there is no downward spread or extension to the ischiorectal fossa," I must set my personal knowledge of six recent recurrences in this situation after radical operations by competent proctologists, my only course is to state both views as fairly as possible.

I am, Sir, yours faithfully,

Harley-street, W., Jan. 25th. W. H. OGILVIE.

PROTAMINE INSULIN

To the Editor of THE LANCET

SIR,—I shall be glad if you will correct an erroneous impression which might be derived from the brief report in your issue of Jan. 16th of my remarks following Dr. Hagedorn's lecture on protamine insulin—namely, that Dr. Hagedorn had willingly delayed the issue of British-made protamine insulin. This is far from being the case. Dr. Hagedorn gave to the manufacturers of "A.B." insulin, most promptly and readily, every assistance to enable them to prepare protamine insulin (without added zinc) according to his method. Such delay as has occurred has resulted from the desire which prompts all British

manufacturers of insulin to avoid the chaos which would ensue if the firms concerned were to issue protamine insulin possessing different degrees of retarded action.—I am, Sir, yours faithfully,

FRANCIS H. CARR.

The British Drug Houses Ltd., Graham-street, London, N.1, Jan. 25th.

THE LEGAL POSITION OF HERBALISTS

To the Editor of THE LANCET

SIR,—The summing up by Mr. Justice Atkinson in the case of Sones *v.* Foster, tried in the Court of King's Bench on Jan. 21st, calls, I think, for medical comment. The learned judge is reported in the *Times* to have said that "Herbalists have been recognised legally since the passing of a statute in the reign of Henry VIII which has never been repealed"; and as the defendant in the case seems to have claimed to be a herbalist as well as a naturopath the inference to be drawn was that he was exonerated by that Act as far as its application went.

I recall a previous occasion when the learned judge, Mr. Atkinson as he then was, evinced an interest in unqualified practice, for he moved an amendment in the House of Commons on Feb. 9th, 1926, to a motion which I had introduced: "That, in the opinion of this House, an authoritative enquiry, with the object of making recommendations to Parliament for dealing with the whole position of irregular practice in medicine and surgery, is urgently necessary." Mr. Atkinson's amendment was "That in the opinion of this House an authoritative enquiry with the object of securing the recognition and registration of manipulative practitioners having approved qualifications is urgently necessary."

With all respect I submit that the learned judge's exposition of the present position of herbalists is inaccurate and his description of the effect of the statute incomplete. The history of this statute is interesting. The first attempt to regulate medical practice in England was made by Act 3 Henry VIII, by which no person was allowed to practise as a physician or a surgeon within the City of London or a radius of seven miles from it without examination or approval by the Bishop of London, or, outside that area, by the Bishop of the diocese concerned. A curious survival of this prerogative of the bishops is the privilege, still existing but never put into operation, of the Archbishop of Canterbury to confer degrees in medicine. The Act 34 and 35 Henry VIII, which is the Act referred to by the learned judge, was apparently passed to allow certain persons to administer medicines without having the licence from the bishops provided for by the earlier statute.

The permission given by it for herbalists to practise was limited to the use of external applications or, in the event of internal medication, to the treatment of three specified diseases, "stone, strangury, or agues." Judicial interpretations subsequent to the passage of the Act declared limitations further restricting its scope. Thus it was early laid down that its effect is that "it does not extend either in words or intent or meaning to give liberty to any person to practise or exercise for gain or profit." The parties licensed by that statute are "such persons as shall be good honest people, as old women and such as are inclined to give their neighbours physic from charity and piety"; and indeed the original Act contained the stipulation that the privilege should be restricted to those who "minister to the sick without fee." As the original Act made no provision for testing the knowledge of the herbalist or for any responsible body to administer the Act, it remained practically inoperative and this circumstance, as well as its implied supersession by later Medical Acts, no doubt explains the omission to repeal it formally.

Surely any claim that the statute of Henry VIII legalises the general practice of medicine and surgery by herbalists and that their position is unaffected by the Medical Acts which have since been placed upon the Statute Book could not be sustained.

I am, Sir, yours faithfully,

House of Commons, Jan. 22nd. E. GRAHAM-LITTLE.

PERFORATED GASTRIC ULCER

To the Editor of THE LANCET

SIR,—The annotation on p. 216 of your last issue on the use of "a hollow sound" by Dr. Robert Leclercq, in treating a perforated gastric ulcer which could not be sutured, reminds me that it is some seven or eight years since I first employed a similar manœuvre. I do not suppose that the procedure was "original" on my part, though it is not mentioned in most books on operative surgery. Being faced, like Dr. Leclercq, with a large perforation which could not be closed, I introduced into the stomach a large soft rubber catheter which fitted the hole. This was not employed afterwards, however, for emptying the stomach, for I pushed it on into the duodenum, and used it for giving the patient large amounts of fluids directly into his alimentary canal. The catheter was brought out through a layer of omentum and then through a stab wound in the abdominal wall. No leakage took place and after a few days, when adhesions had formed, the catheter was removed and the opening quickly healed. I have used the method on two or three occasions since that time with the same success. Small perforations can often be successfully "plastered" with a tag of omental fat, but this method may fail when the perforation is large. The catheter may then be employed with confidence.

There can be few surgeons in this country who would contemplate the alternative of performing a partial gastrectomy in the presence of any perforated ulcer. To save the patient's life is the first consideration, without prejudice to whatever further treatment may be necessary afterwards when the crisis has been passed.

I am, Sir, yours faithfully,

London, Jan. 24th. GEOFFREY KEYNES.

OVERBREATHING TETANY

To the Editor of THE LANCET

SIR,—We were much interested in the two papers by Drs. McCance and Watchorn, and Drs. Cumings and Carmichael in your issue of Jan. 23rd. These workers record their failure to confirm some experimental findings published by us last year, and their papers call for some comments.

In the second case recorded by Drs. Cumings and Carmichael, the level of the calcium in the cerebrospinal fluid (C.S.F.) rose from 4·2 mg. per 100 c.cm. to 4·4 mg. in eighteen minutes and to 4·8 in the course of twenty-eight minutes. Whilst these workers state that the first alteration is within their limits of experimental error, they do not say whether this applies to the total rise. If it does so their results in no way vitiate our own, for we recorded alterations of only 0·5 mg. per 100 c.cm. and this would fall within their limits of experimental error.

There is no record in their paper of the volumes of C.S.F. used in their estimations of calcium. We

ourselves calculated our experimental error in a preliminary series of determinations on known solutions, and reduced it by using 6·0 c.cm. of fluid in each estimation. This necessitated the removal of 15 c.cm. of C.S.F. from the patient for each determination of calcium and phosphate. One of the reasons why we did not take our resting specimens immediately before the period of tetany, but on the previous day, was our fear that we might produce severe post-lumbar puncture headaches in our patients if we removed as much as 30 or 45 c.cm. of C.S.F. within half an hour. The other reason was that our first patient seemed to develop symptoms of tetany gradually, and had premonitory symptoms and signs such as paræsthesiæ and Chvostek's sign for four or five hours before overbreathing brought on carpopedal spasm and laryngismus stridulus. It seemed reasonable to assume that during this period changes in the diffusible calcium might already have been occurring.

If this alteration recorded by Drs. Cumings and Carmichael in the C.S.F. calcium is outside their limit of experimental error it becomes of importance, for it shows that changes were occurring in the level of the C.S.F. calcium during that period of twenty-eight minutes—although in a direction opposite to that recorded by ourselves.

Clearly determinations of the ultrafiltrate calcium of the serum were desirable in our patients, but we had not the facilities for overcoming the great practical difficulties involved in such estimations—as, for example, keeping the serum in gaseous equilibrium throughout the ultrafiltration. We were therefore interested to read that Drs. McCance and Watchorn had performed this determination (presumably on serum, although this is not made clear by them) but regret that experimental details were not given.

If one sets aside theoretical considerations as to the mechanism by which the C.S.F. is formed, on which we do not find ourselves in agreement with these workers, the experiments of Drs. McCance and Watchorn suggest that the drop which we found in the C.S.F. calcium was not related to the tetany itself. Were this the case the changes found by us and by Drs. Cumings and Carmichael would indicate that the calcium content of this fluid does not remain constant for any individual, but varies by as much as 10 or 12 per cent. from day to day and from hour to hour. This would be of great importance in the interpretation of the work which has been done, and is being done, on the calcium content of the C.S.F. in other conditions.

We are not aware that such variations have been reported.

We are, Sir, yours faithfully,

C. G. BARNES,
R. I. N. GREAVES.

Hammersmith-road, W., Jan. 25th.

WAS SHERLOCK HOLMES A DRUG ADDICT?

To the Editor of THE LANCET

SIR,—I am writing to comment upon a recent reference in your columns concerning the character of Sherlock Holmes, the fictional creation of my father, the late Sir Arthur Conan Doyle, M.D.

Your contributor's interesting notes on cocaine poisoning give the erroneous impression that Holmes was a "drug addict." As a matter of actual fact, my father neither conceived nor depicted Sherlock Holmes as a drug addict. He was represented as one of those rare individuals who use drugs sparingly and occasionally, and who are the masters rather than the slaves of the drug concerned.

It would be superfluous for me to emphasise the differentiation between the two categories.

I am, Sir, yours faithfully,

Jan. 9th. DENIS P. S. CONAN DOYLE.

HOSPITAL AMALGAMATION IN LIVERPOOL

To the Editor of THE LANCET

SIR,—The alterations in the Liverpool United Hospital Bill, of which the secretary of the Associated Voluntary Hospitals Board gives particulars (p. 232), are interesting, especially the exclusion of the purchase of surgical instruments and appliances from the purview of the medical board. As regards the representation of sections of the medical staff on the board my letter, in spite of the secretary's assertion to the contrary, stated clearly that "there is a power to coöpt within limits of particular offices set forth in a schedule." The point, of course, is whether the old phraseology of legal documents referring to "medical and surgical staffs" is adequate in view of the development of special departments, especially since the establishment of the British College of Obstetricians and Gynæcologists.

I am, Sir, yours faithfully,

C. E. A. BEDWELL,
House Governor.

King's College Hospital, Denmark-hill, S.E., Jan. 25th.

OMENTOPEXY

To the Editor of THE LANCET

SIR,—In Mr. O'Shaughnessy's admirable account of the surgical treatment of cardiac ischæmia, there is one point that deserves correction. The author refers to the omentopexy of Rutherford Morison as an operation for cirrhosis of the liver and he comments on this matter as though that operation might be expected to influence favourably this obscure disease. May I say that Drummond and Morison devised their operation not with the idea that it might cure cirrhosis, but as a method of dealing with the ascites, which may be such a distressing sequel of the changes in the liver? When used for this purpose alone, and in the circumstances which the authors of the operation indicated as being necessary to hold out a prospect of success, it has been most valuable.

In showing its usefulness, may I be permitted to say that the patient to whom Mr. O'Shaughnessy referred and on whom I operated—and who is now well thirty years after the operation—was rapidly going downhill at the time of the intervention. He was accustomed to be tapped every fortnight and as a rule 22 pints of fluid were removed. A year after the operation he underwent a further intervention for the radical cure of hernia and for many years afterwards he was to all intents and purposes perfectly well and able to follow the laborious occupation of a stoker in a gas works. For some years now he has lived in retirement, but when I heard from him in November last he was still enjoying good health.

Experience of this operation extending over many years has emphasised, what Rutherford Morison originally pointed out, that if these patients are to remain well they must give up the use of alcohol. The successful cases with which I am familiar have always faithfully observed that rule.

I am, Sir, yours faithfully,

London, W., Jan. 25th. G. GREY TURNER.

RADIOGRAM AND RADIOGRAPH

To the Editor of THE LANCET

SIR,—Your preference for the word *radiogram* in your supplement "On writing for THE LANCET" and your defence of it in the subsequent correspondence seem to me to be reasonable and logical. Radiologists are divided into two camps on this question, but there are many who, like myself, feel the termination *-graph* for the verb and *-gram* for the noun to be more comfortable. In medical discussions I often hear confirmed champions of *the radiograph* unwittingly calling it *the radiogram*. *Skiagram* has a slightly archaic flavour, and has few friends nowadays, while *roentgenograph* and *roentgenogram* are too distinctively American to gain ready acceptance in this country. I believe that an etymological purist would question the respectability of the entire tribe, so mixed is their parentage. *Radiogram* is in this respect no worse than its relatives. *Radiograph* as a verb we must retain: an X ray technician is a *radiographer:* there is a Society of Radiographers, and *radiography* is the appointed work of its members. I would strongly urge the retention of *radiogram* as the corresponding noun. I would even ask that those who prefer it should not be asked to change it when contributing to a journal which happens to prefer *radiograph* as the noun. More than that, I venture to hope that the "Oxford Dictionary" will accept it in the future, for its use in medical literature is well established. One point should not be lost sight of—namely, ease of pronunciation. A simple trial will show that it is easier, and slightly more euphonious, to say *the radiogram shows* or *in the radiogram there is* than to say *the radiograph shows* or *in the radiograph there is*—a point to consider in reading, or listening to, a paper in which such phrases often recur. The word is needed, and is probably more often used, in this special sense than in the sense of a wireless message, which is usually spoken of as a *wireless* or a *radio* in colloquial speech. *Radiogram*, in medical literature, has now passed its fortieth birthday, and may be considered to have atoned, by forty years of useful work, for its rather disreputable ancestry.

I am, Sir, yours faithfully,

Jan. 24th. RADIOGRAMMARIAN.

A SURVEY OF DIETS

A FEW years ago Prof. E. P. Cathcart, F.R.S., and Mrs. A. M. T. Murray published accounts of the amount and type of food eaten by 154 families at St. Andrews and by others at Cardiff and Reading. The diets were then expressed for the most part in terms of protein, fat, and carbohydrate. The figures of those investigations have now been tackled afresh and tabulated according to the actual articles of food. In a report just issued as a green-book [1] these findings are given together with a comparison of the choice of food by families of similar economic standing in 1911 and 1933, a report on the diets of 109 women students and some observations on the proportion of food lost in cooking and waste.

To take the parts of the report in order: the St. Andrews families ranged from the professional classes to the unemployed and were classified into seven groups according to the wage-earner's employment (or unemployment). The average weekly expenditure on food per man-value ranged in the groups from 6*s*. 2*d*. to 18*s*. 5*d*. Part of the inquiry was repeated at another season. As might be expected the amount of meat eaten varied with the money spent on food; bread showed the opposite tendency; fish and game, classified together, were consumed fairly uniformly except in the richest group; cereals and legumes grouped together were eaten least by the two lowest expenditure groups and in fairly constant amounts by the rest. The diets were also analysed for their content of calcium, phosphorus, and iron by using figures from Sherman's Tables and from Sir John Orr and the Rowett Institute. With this method of reckoning, all groups were found to take more than the 0·68 g. calcium considered to suffice. The two poorest groups alone got less iron and phosphorus on average than is considered necessary.

The 53 Cardiff families were drawn on the whole from the less well paid inhabitants; their average expenditure on food a week per man-value ranged from 6*s*. 8½*d*. to 12*s*. Here the meat consumption varied with income; the choice of kind of meat differed in some respects from that in St. Andrews, for instance, notably fewer sausages were eaten.

The 48 Reading families were on the whole poorer than the others considered. Their average weekly expenditure on food a week per man value was 5*s*. 2½*d*. to 9*s*. 4½*d*. Here again the amount of meat and dairy produce eaten varied with income. The average dietaries for each group of consumers in Cardiff and Reading were considered to contain more than the basal requirements of calcium, phosphorus, and iron and in each district and in every group the amount of first-class protein was considered to be above the minimum required. The average weekly consumption of milk in St. Andrews, Cardiff, and Reading was respectively 4·68, 1·89, and 3·3 pints per man; many more of the Reading families were receiving free or cheap milk than in the other districts.

The diets of the 12 Glasgow families in 1933 differed from the 23 recorded in 1911 in several respects; margarine was not eaten in the 1911 investigation, while 11 out of 12 of the families of the 1933 group ate it. All the families bought white bread; but, whereas none before the war bought brown, a quarter of the 1933 group did so. The consumption of oatmeal had greatly diminished since 1911. The consumption of roots had risen definitely and that of leafy vegetables still more (29 per cent.); none of the 1911 families and three-quarters of the 1933 group had eaten fresh fruit; the 1911 families took on average about 3 pints of fresh milk per man per week, the 1933 about 2·5 pints; in both lots some families bought milk in other forms: 7 out of 23 bought buttermilk in 1911 and only 1 in 1933; 5 of the first group bought condensed milk and 7 of the second.

At the College of Domestic Science in Glasgow 109 women students ate meals of their own choosing and noted down afterwards the quantities they had taken for from three to five days. The students were weighed and measured, and examined by a doctor and a dentist. Their average height was 162·1 cm.,

[1] A Dietary Survey in terms of the Actual Foodstuffs Consumed. By E. P. Cathcart and A. M. T. Murray. Spec. Rep. Ser. med. Res. Coun., Lond. No. 218. London: H.M. Stationery Office. 1937. Pp. 56. 1*s*.

slightly more than the 159·2 cm. used in the British Medical Association report; their average weight was 55·85 kg. (B.M.A. figure, 55·8 kg.). Their average calorie intake was 2035 calories a day; this figure, the report points out, is in keeping with the 2400 calories laid down by the League of Nations committee, if the needs of a woman are accepted as 0·83 of a man's. The average amount of protein taken was 76·10 g., of which 58·5 per cent. was first-class protein, a high proportion. As the report says, the League committee laid down no level of fat requirement because it is so variable; the average fat consumption of the students, 79·01 g. a day, is therefore compared with the average for the St. Andrews diets, 118·6 g. The average calcium intake (0·69 g.) was very close to the figure 0·68 g. considered by Sherman to afford a margin of safety, but the intakes varied widely.

The estimation of losses incurred in preparing and cooking food and in its residue were made by two means: large numbers of samples were tested out at the College of Domestic Science and the waste portions expressed as percentage of the weight of the articles purchased; here, of course, bones counted in heavily and the waste varied from none to 37·8 per cent. In the other series of estimations the actual loss was calculated from the refuse pails of the St. Andrews surveys and expressed as a percentage of the total calorie value. The authors explain that here the losses could only be calculated on edible waste arising from vegetables, bread, and so on; they could not be calculated on bones, ham, or bacon rind, for instance. The mean percentage loss of edible calories was 2·7 and 2·6 for two series. These figures, even if doubled, the report says, "make it very clear that in these St. Andrews families at least the conventional 10 per cent. for refuse and waste far overstates the real position. If these families can be taken as representative then an allowance of 5 per cent. for the loss of edible calories in a mixed diet allows an ample margin of error."

The authors conclude that the surveys cover a very representative sample of the population and that few of the diets could be regarded as really poor, far less hopelessly inadequate in energy, protein, and fat content, first-class protein, and mineral salts. At the same time the content of protective foodstuffs like milk, green food, and milk of many diets left much to be desired. The amount of tinned or prepared food bought was not large. Speaking of a method of improving the dietary standard, they quote Burnet and Aykroyd saying: "There is no reason to doubt that valuable results can be obtained, even among families with very small incomes, by educational means." "This," they add, "is not to say that lack of means plays no part. . . . Some at least of the families would have spent more on food if the money had been available. But even so a large percentage would tend to purchase items of a luxury rather than those of an essential type. The main causal factor of inadequate diets in many households is ignorance of how to buy, what to buy and how to use to the best advantage the material bought. . . . Balance of expenditure is an art unknown or ignored by many." The authors go on to point out some of the difficulties which hinder the diffusion of knowledge of dietetics and express the opinion that such teaching can only be sure of reaching the housewives if brought by personal contact, demonstrations with utensils which the wives can get too, and patient talk.

IRELAND

(FROM OUR OWN CORRESPONDENT)

SOCIAL SERVICES IN THE IRISH FREE STATE

Mr. Sean T. O'Kelly, Minister for Local Government and Public Health in the Irish Free State, in a speech made in Cork last week reviewed the present condition of the various social services under the control of his department. Speaking about national health insurance, he said that there was every indication that with the unification of the approved societies administration will be greatly improved. The membership of the society is increasing yearly, and is now over 500,000. The policy of his department and of the society is to ensure that the provisions of the National Health Insurance Act, 1933, are fully complied with; that all contributions legally due will be paid; and that every insured person will receive promptly the benefit to which he is entitled; and, on the other hand, to preserve the funds, which belong to the insured persons themselves, from depletion by dishonest claims. Under the Widows and Orphans Pension Act, pensions amounting to £265,000 a year are being paid at present for 14,360 widows and 14,700 children, including orphans. Under a new Bill already introduced the scope of the scheme will be considerably extended, for it will provide for all necessitous widows with dependent children, and the qualifying age for childless widows will be reduced from 60 to 55.

While a substantial sum is held by the Hospitals Trust Fund, Mr. O'Kelly said that it is to be used for endowment and also for projects now in the preliminary stages that eventually would require heavy expenditure on building and equipment. There is a danger, he added, that with large sums available institutions might be erected without consideration of how much it will cost to maintain them, but it is not intended to multiply institutions and burden the ratepayers with heavy expenses merely because there is money for their erection.

An investigation in selected areas has begun to ascertain the incidence of mental deficiency and epilepsy in the community. This investigation, which is an essential preliminary to legislation, may take some time to complete, but will result, he hoped, in better provision for these unfortunate classes.

Among the new services that are yearly increasing in importance are the maternity and child welfare and the school medical services. There are still, however, a few counties where, owing to the absence of county medical officers of health, the medical inspection of school-children has not yet begun. In 1935 the number of children in the country medically examined exceeded 90,000. Under all schemes facilities have been provided for treating the defects discovered, and there are very definite indications of the improvement in the physical condition and health of the children. Full advantage ought to be taken of the opportunities during their school life to correct as far as possible physical defects, and to give the children a healthy start in life. About 24,000 children are being fed daily and every opportunity is being taken to urge the value of a milk ration of good quality and the necessity of ensuring the purity of the milk supplied.

In 1932, the Minister concluded, the programme of the Government was for 75,000 houses to be built in a period of ten years, and the 35,000 mark has now been passed.

OBITUARY

HAROLD WATERLOW WILTSHIRE, D.S.O., M.D.Camb., F.R.C.P. Lond.

Harold Waterlow Wiltshire, born in 1879, was educated at Cheltenham and Clare College, Cambridge, where he went in 1897. He was always keen on sports, and having gone into residence at Clare he took up rowing, perhaps giving more time to that pastime than was quite consistent with his early medical studies. The master of his college reminded him that he came to Cambridge "to read and not to row." Enough! he settled down to study, and quickly passed his second M.B., and graduated B.A. in 1900. In 1901 he entered the medical school of King's College Hospital, where his uncle, Dr. (later Sir) David Ferrier, was the senior physician. He immediately put his whole energy into the work of the hospital and the social life of the school. He joined the hospital medical society, and attended the meetings regularly. He was a keen lawn-tennis player, and was chiefly instrumental in resuscitating the hospital lawn-tennis club. He became a member of the Hospital VI which won the inter-hospitals junior tennis cup in 1909, and in later years he frequently captained the honorary staff VI which played against the Students VI. He took a leading part in the formation of King's College Hospital Clubs and Societies Union which was founded in 1908.

Wiltshire held the junior hospital appointments at King's so successfully, and became such an accomplished and attractive teacher of clinical medicine, that in 1910 he was invited to become assistant physician. He regularly drew large numbers of students to his out-patient department, and amongst his colleagues, the students, and the nursing staff he soon became the most popular man in the hospital.

When the European War broke out in 1914 Wiltshire immediately joined up; he was gazetted captain in the R.A.M.C. and served in France. In 1916 he became temporary major, and was transferred to Salonika. He was three times mentioned in despatches and for his distinguished war service he was awarded the D.S.O. in 1918, the O.B.E. in 1919, and the Order of St. Sava of Serbia.

In 1919, when new departments were created in the medical school of King's, Wiltshire was immediately chosen director of the cardiological department; he was also appointed vice dean, and when "The Platanes," the hall of residence for students on Champion Hill had been reorganised, he was appointed the new warden in charge. He had been elected president of the Listerian Society in 1914, but in consequence of the war no meetings were held; he was however again elected president in 1919.

In 1922 Wiltshire relinquished private practice in order to devote his time to teaching and administration. He remained physician to the hospital but combined clinical teaching with the lectureship and demonstratorship of morbid anatomy so that clinical teaching then became linked up with post-mortem findings. In 1924, however, to the profound regret of his colleagues at King's, he was compelled through serious illness to relinquish some of his teaching appointments; unfortunately his health became steadily worse, so that in 1925 he felt compelled to resign his office at King's; he was immediately appointed consulting physician to the hospital.

He married Miss Ellen Tibbits, daughter of the late Edward Tibbits, M.D., of Bradford, and then retired to Bembridge, Isle of Wight. His wife had been a former sister at King's College Hospital, and with devoted care she nursed him back to reasonable health, so that he was able to enjoy some of the peace and quiet of country life. He soon became an enthusiastic and successful gardener.

Unfortunately his wife herself became seriously ill in the early part of 1933, and he then nursed her with tender devotion, but after some months she died of an incurable illness. Her death was a sad blow to Wiltshire, and from it he never really recovered. His health began to fail rapidly, and he became very ill in July last. He realised exactly what was happening, but he bore his final illness with inexhaustible patience and fortitude. He died on Monday, Jan. 18th.

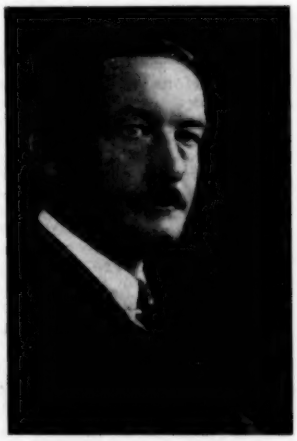
Harold Wiltshire always gave of his best, whether treating a patient, teaching a student, or playing a game—he never spared himself, and by his death there has passed on a brave gentleman, a good and sincere friend, a charming companion, and a loyal colleague.

H. WILLOUGHBY LYLE.

WILLIAM VERNON SHAW, O.B.E., M.D. Oxon.

MEDICAL OFFICER, MINISTRY OF HEALTH

WE regret to record the death on Jan. 21st of Dr. W. Vernon Shaw. Born in 1874, the eldest son of a former rector of St. John's, Chelsea, and subsequently of Callington, Cornwall, Dr. Shaw was a graduate in arts and medicine of the University of Oxford, and there and at St. Mary's Hospital he had a brilliant career, being Brackenbury exhibitioner at Balliol in 1891, and winning an open science scholarship at Christ Church a year later. He took a first-class in Parts I and II of the Natural Science School, and was for some years a demonstrator in physiology on the University staff, and tutor and lecturer at St. John's College. He gained an entrance scholarship at St. Mary's Hospital, and was Kerslake Scholar in 1899. After holding several house appointments at St. Mary's Hospital he was for some years in practice at Malton, before being appointed to the staff of the National Health Insurance Commission in 1913. During the war he was engaged in mobilising the supply of drugs and medical stores for the Forces and civil population, a position for which his training in organic chemistry eminently fitted him, and for his services he was awarded the O.B.E. in 1920.



[Photograph by Elliott & Fry

DR. SHAW

The following from a friend in the Ministry of Health is a general estimate by his colleagues of Dr. Shaw's fine qualities.

"Endowed with an alert mind and retentive memory, by wide reading and experience, Vernon Shaw had acquired a profound knowledge of clinical and preventive medicine. Yet he was eminently practical, and his reputation as an epidemiologist 'in the field' was second to none, and it will secure for him an honourable place in the public health annals of our country. He will be remembered gratefully by many medical officers of health for his diagnostic acumen in outbreaks of small-pox. His thorough and painstaking investigations into outbreaks of enteric fever and other infectious diseases in Gloucester, Chorley, Bolton-on-Dearne, Denby, Malton, and Eton are recorded in the official publications of the Ministry, and they will remain as classics for future students of epidemiology. His strenuous and illuminating work during the recent epidemic of typhoid fever in Bournemouth and Poole was almost the last of his labours.

"As a colleague, Shaw is unforgettable. He was one of the good companions of official life, full of knowledge, and of such variety of knowledge, wisely used and freely shared; spending himself wholeheartedly—perhaps, at times, recklessly—in the sphere of duty to which he was devoted and in which he could exploit his flair for detection and his telescopic vision of distant clues. Supple, as R. L. Stevenson has phrased it, in things immaterial, he held fast to a code of righteous conduct and though, to be sure, he was always ready and responsive in humour, no discussion, no conversation even, on professional matters could be anything but earnest for him, and he defended or demolished an opinion with parallels or divergents amplified with names, nicknames, dates, places, and ancillary circumstances poured from his astonishing memory. Incompetence, assumption of learning, or maybe a tactless approach, might quickly fuse a vein of impatience in the rich metal of his character, but to honest poverty of ideas he was a gracious and generous benefactor. Official reports give but the formal aspects of his life and work; a diary of his journeyings, experiences and contacts in war time and in peace, and of his own observations on some points in the clinical history of certain of the infectious diseases would have made interesting reading; but if ever he began one it is probable that, unleisured and unintrospective as he was, he would take leave of it without regret.

"He was a staunch Churchman, and regularly read the lessons at his parish church. He had numerous interests; his particular hobby was gardening, but no account of his career would be complete without reference to his skill as a driver of railway locomotives, and he treasured a letter of appreciation which he received from the London and North Eastern Railway for his services in that capacity during the general strike of 1926.

"The death, 15 months ago, of his wife to whom he was much attached was a painful shock to him, and he seemed to seek the dubious anodyne of deeper application to work; now before his time he too has passed on. He leaves a family of one son and three daughters to whom sincerest sympathy is tendered."

Sir James Marchant, writing in the *Bournemouth Daily Echo* of Jan. 22nd, says:—

"In our recent outbreak Dr. Shaw came to our boroughs immediately, and threw himself unreservedly into tracing the source of the disease, in checking its spread, and overwhelming it. He brought to bear upon the outbreak all his special qualifications, and early and late he was to be seen going round our districts, visiting farms and dairies, examining those who were employed in any way in milk production and distribution, following up every clue and suggestion with indefatigable diligence, until the outbreak was under complete control. With all his accomplishments and experience he had the happy gift of working with medical officers of health and local committees wherever he went, and our own representatives have paid warm tribute to his humility, persuasiveness, and sterling character."

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

IN the House of Commons on Thursday, Jan. 21st, Wing-Commander JAMES gave notice that on the House going into Committee on the Civil Estimates he would call attention to the need for implementing the report of the Brock Committee on voluntary sterilisation and move a resolution.

Mr. ROWSON gave notice on the same day that on the House going into Committee on the Civil Estimates he would call attention to the question of nutrition and move a resolution.

In the House of Commons on Jan. 25th the Unemployment Assistance (Temporary Provisions) (Amendment) Bill was read a second time.

In the House of Commons on Jan. 26th Mr. GROVES presented a petition signed by 19,515 citizens in this country asking Parliament to abolish the present powers for the vivisection of dogs.

In the House of Lords on Jan. 26th the Lord CHANCELLOR took his seat on the Woolsack on his return after several months' illness.

Duties on Imported Liver Products

In the House of Commons on Jan. 25th Sir REGINALD CLARRY asked the Government to offer the same exemption from duty to liver products that had been given to sweetbreads used in the preparation of insulin. Continental chemists could import the drugs with a duty of only 10 per cent., instead of the 20 per cent. imposed by the Bill on the raw materials, about 800 tons of which had to be imported annually, only 20 per cent. of this being available from our Dominions. Under the tax the drugs would cost an extra 3½*d.* per person per week.

Captain EUAN WALLACE, Secretary for the Overseas Trade Department, answered that the real difficulty was that it was impossible to trace the progress of liver after it came into this country.

QUESTION TIME

WEDNESDAY, JAN. 20TH

Children and Objectionable Cinema Pictures

Mr. DAY asked the Home Secretary whether he would give particulars of the result of consultations held between his office and the Secretary of State for Scotland on the exhibition at cinemas of objectionable pictures which were harmful to the minds of children and young persons; and what action he proposed taking in the matter.—Mr. GEOFFREY LLOYD, Under-Secretary, Home Office, replied: The hon. Member is no doubt referring to the consultations between the Home Office and the Scottish Office which took place as a result of representations from the National Cinema Enquiry Committee. It was arranged that the two Departments should examine the questions raised by the deputation and in particular that a survey

of the conditions in Scotland should be undertaken. This has now been done, and after careful consideration my right hon. friend and my right hon. friend, the Secretary of State for Scotland, have come to the conclusion that there are no sufficient grounds for the holding of a comprehensive enquiry such as the deputation suggested. It has, however, been decided to make certain changes in the composition and terms of reference of the Film Censorship Consultative Committee which was set up in 1931, and in particular to include representatives from Scotland. The necessary steps are being taken and my right hon. friend before long hopes to be in a position to make a further announcement on this subject.

School-children and Road Safety

Mr. VIANT asked the Minister of Transport whether he had given consideration to the recommendations of the committee on the safety of school-children; and if it was his intention to apply the speed limit in the vicinity of schools in built-up areas.—Mr. HORE-BELISHA replied: Yes, Sir, and to the second part of the question, wherever the circumstances justify it.

THURSDAY, JAN. 21ST

Grants to Voluntary Hospitals in Special Areas

Mr. DAY asked the Minister of Labour whether the commissioner for the special areas had made any grants to voluntary hospitals towards the alteration or extension of their buildings; and if he would give particulars.—Mr. ERNEST BROWN replied: I would refer the hon. Member to paras. 247 and 248 and to Appendix XI of the Third Report of the Commissioner for Special Areas (England and Wales), Cmd. 5303, which covers the period up to Sept. 30th, 1936. The following are brief particulars of schemes for assisting voluntary hospitals which have been approved since that date:—

Organisation.	Nature of work.	Location of work.	Estimated total cost of work.
Sunderland Royal Infirmary.	Construction of new out-patients' department, ward block, nurses' home and staff quarters.	Sunderland.	£83,500
Blaina and District Hospital.	Additions to surgeon's room and mortuary, provision of ultra-violet ray and other equipment, and new motor ambulance.	Blaina.	£874
Rhymney Cottage Hospital.	Provision of new X ray room, nurses' bedroom, new ambulance and other equipment.	Rhymney.	£2,067

Distressed Areas and the Means Test

Mr. THOMAS WILLIAMS asked the Minister of Labour if he had yet considered the suggestions made by the Birmingham association for the relief of distressed areas regarding modifications of the means test; and, if so, if he would state the result.—Mr. ERNEST BROWN replied: I am informed by the Unemployment Assistance Board, with whom I have been in consultation in this matter, that while their legal powers do not enable them to act precisely in the manner suggested by the association, the Board are fully in sympathy with the desire of the association to remove difficulties due to temporary unemployment affecting families or individuals who have transferred from depressed areas. They recognise that household expenses in the new district may for some time after removal be greater than they were in the old, and further, that the removal may result in the creation of special needs. Under the new regulations there is also power, which will be exercised, to meet any reasonable increase in rent which may result from removal. For these reasons it is felt that there should be no apprehension that the position of a household removing to a more prosperous area will be rendered difficult, and the Board suggest that any person in receipt of an unemployment allowance, who contemplates removal, should see the Board's local officer in order that the details of his case may be considered and information afforded as to what his probable position will be in the new area.

Thefts of Dangerous Drugs from Doctors' Cars

Mr. RHYS DAVIES asked the Home Secretary whether he proposed to take any action to prevent the recurrence of cases in which members of the medical profession had had dangerous drugs stolen from their motor-cars.—Sir J. SIMON replied: No, Sir. I have no grounds for thinking that these thefts are other than ordinary cases of petty larceny, and I do not think there is any action I can usefully take in the matter.

Mr. DAVIES: Does not the right hon. gentleman think that some responsibility ought to be placed upon the medical profession for neglecting to take care of these dangerous drugs?

Sir J. SIMON: I think that the remedy here is the exercise of care by the individual who has such a package in his charge. When we consider what a large number of people are moving about—skilled doctors who are attending medical cases—very many of whom have something of the sort with them, I do not know that the number of cases is very surprising.

Scarlet Fever in Doncaster

Mr. SHORT asked the Minister of Health whether he could make any statement respecting the recent outbreak of scarlet fever in Doncaster and area; whether any proof had been obtained as to whether the outbreak was due to a polluted milk-supply; and, if so, what steps were being taken to prevent similar outbreaks in the future.—Sir KINGSLEY WOOD replied: Some 160 cases of scarlet fever occurred in Doncaster and the adjoining rural district in the recent outbreak, together with a considerable number of cases of sore-throat. I am advised that the outbreak was due to the infection of milk from one farm. When the particular milk-supply had been identified as the source of infection, arrangements were made for the pasteurisation of all milk coming from that source. As regards the general question, I cannot add anything at present to the answer I gave on this subject on Nov. 12th.

Mr. SHORT: Will the milk producer be prosecuted in this case?

Mr. MACLAREN: No, he will get a subsidy. (Laughter.)

Small-pox at Oldham

Mr. GROVES asked the Minister of Health on what day the first case of small-pox was discovered at Oldham; for how long had the patient been infected before discovery; and how many cases had been notified.—Sir KINGSLEY WOOD replied: The first case was notified on Nov. 27th, 1936. I am advised that this patient was probably infected about 23 days earlier, which interval includes the period of incubation when there are no clinical manifestations. Nine cases in all have been notified.

Accommodation of Ministry of Health Staff

Lieut.-Commander FLETCHER asked the Minister of Health if he was satisfied regarding the accommodation of the staff at the Ministry; how many of the staff worked in the basement rooms and for what periods of time; if there was overcrowding in any of the rooms; if all rooms occupied by staff had direct communication with the air; if any of the rooms necessitated the use of artificial light throughout the working day; and what representations regarding the office accommodation had been received from the staff associations.—Sir KINGSLEY WOOD replied: I have from time to time received representations from the Departmental Whitley Council about the accommodation provided for the staff of my Department. All such representations are carefully considered and, where necessary, brought to the notice of the Office of Works. In general the accommodation in the Ministry is satisfactory. About 50 to 55 clerks spend a normal working day of about six hours for three months at a time in the basement courts, which are large, light, and well-ventilated rooms. About 30 other clerks work in a basement court about one hour every morning. There

is no overcrowding in any part of my Department; the only staff rooms not in direct communication with the open air are five messenger boxes. Natural lighting in the rooms is generally good and in only a very small proportion of cases is it necessary for any officer to resort to artificial light all day under normal weather conditions.

Health Insurance: Medical Fees for Young Persons

Mr. RHYS DAVIES asked the Minister of Health whether he had now been able to secure agreement with the medical profession in relation to the fees to be paid in respect of young persons entering into employment for the first time; and, if so, if he would state the nature of that agreement.—Sir KINGSLEY WOOD replied: I am still in communication with representatives of the medical profession on this matter and I am not yet in a position to make a statement.

FRIDAY, JAN. 22ND

Ophthalmic Benefit in Scotland

Mr. HENDERSON STEWART asked the Secretary of State for Scotland if he was aware that dissatisfaction was felt by optical practitioners in Scotland at the omission from the new draft regulations for ophthalmic benefit of due recognition of the services of sight-testing opticians; and whether, in view of the proved service of these practitioners, he would state the reason for amending, in this respect, the regulations of 1922.—Mr. ELLIOT replied: I have received certain representations from opticians regarding the terms of the draft regulations referred to and I have arranged to receive a deputation from Scottish opticians on this subject on the 25th instant. The views of the opticians will receive the careful consideration of my right hon. friend the Minister of Health and myself before the terms of the substantive regulations are finally decided on.

MONDAY, JAN. 25TH

Blind Persons

Mr. MESSER asked the Minister of Health how many blind persons were registered in England and Wales; how many were in receipt of the blind pension; how many receiving augmentation-of-income grants from local authorities; and how many above the age of 16 were unemployable.—Mr. HUDSON replied: On March 31st, 1936 (the latest date for which figures are available) there were 67,534 registered blind persons in England and Wales, and of these 22,415 between the ages of 50 and 70 were receiving an old age pension on account of blindness, while 54,675 over the age of 16 were classified as unemployable. I have no information as to the actual number of blind persons who are in receipt of financial assistance from the local authorities.

League and Health Organisation in Spain

Miss RATHBONE asked the Secretary of State for Foreign Affairs whether his attention had been called to the report of the health organisation of the League that 200 motor-omnibuses were needed for the Spanish Government to assist in the evacuation of the civilian population of Madrid; and whether he could assure the House that the Spanish Government would receive every facility for obtaining these motors, if they desired to do so, from this country.—Viscount CRANBORNE, Under-Secretary for Foreign Affairs, replied: I understand that the report of the health experts sent by the Secretary General of the League to Spain at the request of the Spanish Government has been placed on the agenda of the present session of the Council, but that it has not yet been considered by the Council. As regards the second part of the question, I can assure the hon. lady that no difficulty will be placed in the way of the purchase of omnibuses for this purpose.

Cure for Neuro-lymphomatosis

Mr. HALL-CAINE asked the Minister of Agriculture whether his attention had been called to the recently announced discovery by the university of British Columbia of a cure for neuro-lymphomatosis, which caused a loss of £4,000,000 to the poultry industry in Great Britain last year; and whether any action was to be taken in the matter.—Mr. MORRISON replied: I have seen the brief announcement relating to this discovery that appeared a short time ago in the press. As regards the second part of the question, we must, I think, await the full account of the work on which the claim is based.

Milk Supply in Schools

Mr. ELLIS SMITH asked the President of the Board of Education the percentage of school-children who received milk in the schools during 1935 and 1936 in the following places; London, Glasgow, Salford, Stoke-on-Trent, Eastbourne, Hastings, and Bournemouth.—Mr. OLIVER STANLEY gave the following answer with regard to English areas:—

A = Percentage* of children receiving milk under the Milk in Schools Scheme.
B = Percentage* of children receiving milk outside the Milk in Schools Scheme.
C = Total percentage* of children receiving milk.

Area	October, 1935.			October, 1936.		
	A	B	C	A	B	C
London	63·6	0·2	63·8	62·6	0·4	63·0
Salford	46·9	6·9	53·8	44·5	6·9	51·4
Stoke-on-Trent ..	48·1	1·0	49·1	51·3	0·8	52·1
Eastbourne ..	49·0	—	49·0	45·8	—	45·8
Hastings	30·3	2·2	32·5	32·6	2·5	35·1
Bournemouth ..	48·3	—	48·3	30·8	0·7	31·5

* Percentage = Percentage of number on registers.

Coroner and Press Persecution

Sir WILLIAM DAVISON asked the Home Secretary whether his attention had been drawn to the remarks of the coroner in the case of a recent inquest as to the persecution by representatives of the Press in this and other cases of the relatives of people who died under such circumstances; and whether any steps could be taken by the Government for the protection of citizens from Press persecution of the kind mentioned.—Sir JOHN SIMON replied: The coroner in the case referred to observed that all decent people must sympathise with the relatives in the distress which was caused to the bereaved family by the way in which they were persecuted by such inquiries and I must say that I agree with the coroner. I hope very much that the responsible heads of the press may devise a means of preventing the repetition of such incidents by sternly discouraging such mistaken and heartless enterprise. I am proposing to communicate with the Newspaper Proprietors Association and the Newspaper Society on the subject.

TUESDAY, JAN. 26TH

Safety in Mines

Miss WARD asked the Secretary for Mines how many colliery companies employed fully certified mine managers as safety officials; and how many companies issued free safety helmets to their men.—Captain CROOKSHANK replied: In November last there were about 40 mines or groups of mines where special safety officers had been appointed, additional to the manager and other safety officers required by law. I do not know how many of these safety officers held managers' certificates. The arrangements between the owners and the workmen for meeting the cost of the safety helmets now widely used vary considerably. There is no settled practice and I have not got the information asked for in the second part of the question.

Health Insurance Ophthalmic Regulations

Captain MACNAMARA asked the Minister of Health whether he was aware of the anxiety amongst opticians of the country at the new draft regulations concerning the payment of their services for ophthalmic treatment; and whether he would give an assurance that their position would be regularised in the new regulations, so that there would be no doubt about the legality of their claim for service fees in the future.—Mr. HUDSON, Parliamentary Secretary to the Ministry of Health, replied: There has never been any intention of depriving opticians of a fee for services rendered by them in connexion with the supply of glasses to insured persons, but my right hon. friend is aware that some doubt has been expressed

as to the position under the proposed regulations. The matter is receiving the careful consideration of my right hon. friend and of the Secretary of State for Scotland, and if they are satisfied that some modification of the wording of the draft regulations is required in order to legalise the payment of such a fee the necessary modification will be embodied in the substantive regulations.

Bakehouses and Factory Regulations

Mr. VIANT asked the Minister of Health whether his attention had been directed to the impossibility of local authorities being able to prosecute for the purpose of enforcing Section 99 of the Factory and Workshop Act, 1901, authority for such having previously been that of the Home Secretary, but transferred by the Factories and Workshops (Transfer of Powers) Order, 1921; and, if so, was it his intention to introduce amending legislation at an early date.—Mr. HUDSON replied: My right hon. friend is aware of the lack of powers referred to by the hon. member, and my right hon. friend, the Home Secretary, has under consideration the question of dealing with the matter in the forthcoming Factories Bill.

PUBLIC HEALTH

WHAT CHILDREN DIE OF

BETWEEN 1861–70 and 1921–30 the standardised death-rate of England and Wales declined from 21·3 to 10·6 per 1000 inhabitants; in other words, mortality in recent years is but half what it was sixty to seventy years ago. To this reduction the ages of early childhood have made a large contribution. A study of the decline included in the Annual Report of the Chief Medical Officer of the Ministry of Health for 1933 shows that at each year of age between 1 and 5 the death-rate in 1926–32 was a little less than a quarter of the corresponding rate in 1861–70. This improvement still continues. In the most recent years for which figures are available, 1933–35, the death-rate at ages 1–5 years is only, approximately, 40 per cent. of the level in the years immediately preceding the war and even as much as one-third below the rate of the decade 1921–30. A corresponding but less phenomenal improvement is shown at the later ages of childhood.

ROOM FOR IMPROVEMENT

Satisfactory as is this trend and the evidence it gives of a higher standard of health at a most important—perhaps *the* most important—stage of life, we must not let it make us complacent or blind us to the fact that there is still ample room for further improvement. The Registrar-General's Text volume for 1934 [1] includes a comparison of mortality in England and Wales with that recorded in a number of other countries. One of the most striking contrasts is to be seen in early childhood. Mortality in this country in 1930–32 at ages 1–5 was less than half the rate in Hungary and Italy and less than a third of that in Portugal; on the other hand it was more than double the mortality-rate of Norway, nearly double the rate in Sweden, and some 50 per cent. above the rates of Holland and Germany. Even within England and Wales wide differences at these ages are apparent. In 1934 the county boroughs had a rate nearly 20 per cent. above that of the country as a whole, while in the rural districts it was 25 per cent. below. The counties of Durham and Northumberland have childhood rates nearly 50 per cent. above the national level, while in the south-western division, comprising the counties of Cornwall, Devonshire, Dorsetshire, Somersetshire, and Wiltshire, they are one-third below that level. Internationally and internally there is no reason to remain content with the advance that has already so successfully been made. How that advance can be most easily extended may perhaps be clarified by a study of the main causes of death in childhood. The Registrar-General's returns provide the necessary data. The medical tables for 1935, the latest issued, show that that year was particularly favourable to child life, the mortality-rates being below any previously recorded. But, owing to the epidemicity of the common infectious diseases, figures for a group of years are more satisfactory material than those of a single year. We may take those of the last quinquennium, 1931–35, as our index. In those five years nearly 77,000 deaths were recorded at ages 1–5, a mortality-rate of 6·6 per 1000 children; 34,000 at ages 5–9, a rate of 2·2 per 1000; and 24,000 at ages 10–14, a rate of 1·4 per 1000.

[1] See *Lancet*, 1936, **2**, 1228.

THE VARIOUS CONTRIBUTORS

At ages 1–5 the largest contributor was *pneumonia* which in all its forms accounted for slightly more than one-quarter of all the deaths, or a mortality-rate of 1·7 per 1000. The great majority of these deaths are certified as broncho-pneumonia. Next on the list comes the most ubiquitous of the infectious diseases of childhood, measles. In 1931–35 it was given as the cause of death of 9395 children at ages 1–5, or 12·2 per cent. of the total deaths at these ages. At ages 5–9 it was responsible for a further 1364 deaths, or 4 per cent. of the total; at later ages its contribution becomes negligible. Over 10,000 deaths from measles in five years at ages 1–9 is a clear indication of the field in which convalescent and adult serum can operate.

A similar assessment can be made of the maximum advantage, in terms of mortality, that artificial immunisation against *diphtheria* might bring about. In 1931–35 the number of deaths attributed to diphtheria was 5490 at ages 1–5 (7·1 per cent. of the total deaths and a death-rate of 468 per million), 6589 at ages 5–9 (19·4 per cent. of the total deaths and a death-rate of 421 per million), and 1741 at ages 10–14 (7·3 per cent. of the total deaths and a death-rate of 102 per million), a total of nearly 14,000 deaths in five years at ages 1–14. Its relative importance at ages 5–9 is particularly striking; in these five years diphtheria was the cause of nearly 1 death in every 5. No efforts to lower the general mortality-rate at these ages can ignore that fact. *Whooping-cough* is a serious cause of mortality at the youngest ages, 1–5, but not thereafter; at ages 1–5 it was directly responsible in the years of review for 5622 deaths, or 7·3 per cent. of the total mortality.

Two other causes stand out at each of the age-groups—namely, *non-respiratory tuberculosis* and *violence*. To the former was attributed between 8 and 9 per cent. of the total mortality at each age (a total of some 11,000 deaths at ages 1–14). From the latter the annual average number of deaths was a little over 1000 at ages 1–5 (with, roughly, 3 males to 2 females), nearly 900 at ages 5–9 (2 males to 1 female), and some 500 at ages 10–14 (3 males to 1 female). Put proportionately, roughly 1 death in 15 at ages 1–5, 1 in 8 at 5–9, and 1 in 9 at 10–14 was due to violence of one kind or another. The causes naturally change with increasing age. In the youngest age-group the highest contribution is made by burns and scalds, closely followed by deaths from falls and crushing (a heading which

includes road accidents); at the later ages burns become relatively few, drowning comes into greater prominence, but some two-thirds of the deaths are debited to falls and crushing. Improvement in this category is, therefore, very much a problem of the roads, and for that, unfortunately, there appears to be no easy or immediate solution. Deaths due to burns have declined substantially in the last quarter of a century.

The epidemic diseases of the central nervous system make a relatively small contribution and fluctuate considerably from year to year. In 1931–35 the average annual quota at ages 1–14 was 88 deaths from *poliomyelitis* (acute and polio-encephalitis), 75 from *encephalitis lethargica*, and 434 from *cerebro-spinal fever*. The 2171 deaths from the last, the product of the epidemic rise and fall in this disease since 1929, are but little below the deaths due to *scarlet fever*—viz., 2589 deaths. In 1931–35 the notifications of the former (at all ages) were 7850, of the latter they numbered more than half a million, a striking contrast in relative fatality.

Respiratory tuberculosis appears as a cause of death at each age but not prominently before the group 10–14 years, in which it caused approximately one-thirteenth of all the deaths. Its continual decline both in childhood and adult life holds out hopes of a considerable improvement in this figure. Other causes that become of numerical importance in these later years of childhood are *heart diseases* (10·4 per cent. of all deaths), *rheumatic fever* (4·7 per cent.), and *appendicitis* (4·6 per cent.). To the last named were attributed in this five years close on 3000 deaths at ages 1–14, and it is reasonable to suppose that a proportion of these might be averted. Other diseases of the *digestive* system have their peak in early life and decline as childhood advances. A final cause of death of no small importance at each age is disease of the *ear* and *mastoid sinus* to which in these years of childhood between 500 and 600 deaths were annually attributed.

THE WORST OFFENDERS

Ignoring these and many other relatively minor causes of death, this brief review of what children die of in England and Wales brings us to the following answers. At ages 1–5 the most prominent causes of death in recent years have been (in order of their importance) pneumonia, measles, non-respiratory tuberculosis, whooping-cough, diphtheria, and violence; together they accounted in 1931–35 for just over two-thirds of the total mortality-rate at these early ages. At ages 5–9 the most important components are diphtheria, violence, pneumonia, and non-respiratory tuberculosis, accounting for half the total mortality. At ages 10–14 we have in order of merit, or rather demerit, violence, heart disease, non-respiratory tuberculosis, respiratory tuberculosis, diphtheria, and pneumonia, accounting in all for just over half the total mortality.

Diphtheria, pneumonia, violence, and non-respiratory tuberculosis appear, it will be noted, in each of the three age-groups and contribute, approximately, one-half the total mortality at 1–5 and 5–9 and one-third at 10–14. Clearly under these four headings must lie a good share of the possible improvement in our mortality-rates in early childhood.

Maternity in Willesden

A MAJOR difficulty in the study of maternal mortality is to obtain series of confinements which are sufficiently large, sufficiently homogeneous, and comparable one with another. The expected mortality is only about 4 per 1000, and hence it is only in series of at least 10,000 confinements that fluctuations in the mortality-rate due to chance alone are not likely to be very considerable. Such a series is rarely comparable throughout. Changes in the type of patient included, in methods adopted and in record-keeping may each make it impossible to generalise about any one series, and when a comparison of one group with another is required the difficulties in finding comparable series are very great. The women in every group, whether attended by doctors, by midwives, or at institutions, are in some way selected, and only the puerperal mortality-rate as recorded by the Registrar-General, which must by definition include all the deaths certified as due to natural causes, based on all the births, is free from these objections. Even here we must be chary of our conclusions since, apart from the effects of chance, the incidence of morbidity may vary between different areas; the incidence of the toxæmias, for example, is believed to be higher in the north and west of England than in London and the south-east.

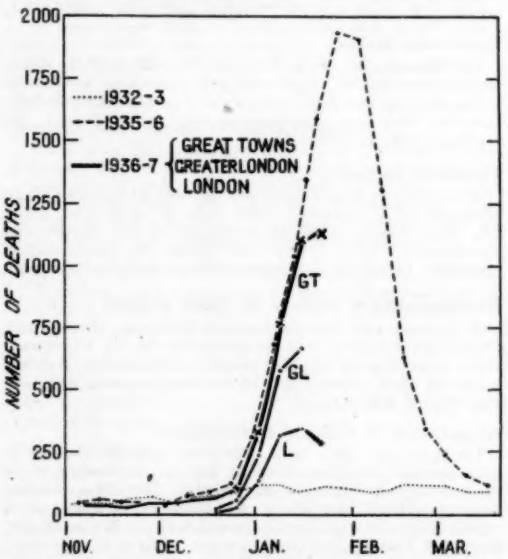
Comparisons, therefore, in maternal mortality-rates are not only odious; they are fallacious. Nevertheless the puerperal rate recorded by the Willesden public health department for the first 3000 women confined in their maternity hospital does at least merit attention and further inquiry.[1] Of the total, 2939 were "booked" cases and showed a puerperal mortality-rate of 1·02 per 1000 (live and still) births, while 61 were admitted as emergencies, with a mortality-rate of 65·57; so that the rate for the whole series was 2·33. The women were unselected in the sense that none were refused admission or transferred elsewhere (except a number of normal cases who could not be admitted owing to pressure on beds) and having regard to the large number of abnormalities and to the extremely high proportion of primiparæ (1454 primiparæ to 1546 multiparæ), these rates are very satisfactory. If the women admitted as emergencies and the 4 deaths among them are taken out of the hospital's series and included in the remaining 11,213 births and 44 deaths respectively, which occurred in the borough during the years in question, a puerperal mortality-rate over the period for the rest of the borough of 4·26 is obtained. This latter rate presumably contains a certain number of deaths from abortion and other deaths early in pregnancy: such women would not in any case have come under the care of the maternity hospital and the implied argument is somewhat weakened thereby; but even so the deduction can fairly be made that in Willesden the chances of a safe confinement are greater, as a whole, for a woman who is confined as a booked case at the maternity hospital than for one who is confined elsewhere.

The report does not give details of the borough council's maternity organisation or of the particular methods in use by Mr. Arnold Walker at the maternity hospital. It will be recalled that on the advice of the medical officer of health, Dr. G. F. Buchan, the council some years ago placed an experienced consultant obstetrician in direct clinical charge of their whole maternity organisation, including the maternity hospital, and this is the main feature of their scheme. This far-sighted policy is now, it seems, being justified by its results.

[1] Walker, A. L.: Clinical Report of the Willesden Maternity Hospital. First Three Thousand Cases. 1936.

Influenza

LAST week 1130 deaths were attributed to influenza in England and Wales. The number is only 30 more than those reported in the previous week, and it is now evident that the epidemic is on the wane and will not reach the peak of 1932–33. This can be seen on the graph which has been brought up to last Saturday, and on it now is traced the course of the epidemic in London and in the Greater London which includes 26 towns in the Outer Ring. Here it may be noted how large a share of the mortality was at first taken by Greater London, but that the epidemic began to abate there while it was still extending in more distant parts of the country. Last week in London itself the deaths had dropped sharply from 344 to 273. Those who wish to trace the probable



Graph showing total deaths from influenza in the Great Towns on the last day of each week in three different years.

course of the curve for the Great Towns during the next week or two may note that the ratio of deaths since the beginning of the year has diminished week by week in the following scale: 3·4, 2·4, 1·4, and now 0·97.

It is generally agreed that the character of the disease has changed but little during the epidemic, and certainly not in the direction of becoming more virulent. This is evident from the age-distribution of the 1100 deaths in the week ending Jan. 16th. There is no sign here whatever of the shift of mortality to the younger ages which is the now familiar danger signal.

Ages.	Deaths.	Percentage of total.
0–24	71	6·5
25–44	111	10·1
45–64	380	34·5
65 and over ..	538	48·9
All	1100	100·0

Admissions to L.C.C. hospitals have, we learn, fallen right off. There is still some pneumonia among the older people, but the notifications of pneumonia in London dropped from 449 to 328. In the previous week 2823 cases of pneumonia were reported throughout the country as against 2338, the increase being mostly in Yorkshire and the north-western area. This tendency does not seem to have extended further north. Pneumonia has been little mentioned in Edinburgh and still less in Northumbria; the distribution has been patchy, and often neighbouring communities have suffered very unevenly. Most distress has been felt in the Yorkshire wolds and the Scottish islands where wind and rain have contributed. In Ireland while there have been more cases the type has remained definitely mild; there is in fact no abnormal pressure on Dublin hospitals for this time of year. It has been said with some truth that all over the British Isles the medical profession has been busier than it was during other equivalent epidemics because of the greater readiness of the public to call for their help; the habit has been variously described as valetudinarian or sensible.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED JAN. 16TH, 1937

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 2 (Failsworth U.D., Lancs); scarlet fever, 1513; diphtheria, 1186; enteric fever, 57; pneumonia (primary or influenzal), 2823; puerperal fever, 40; puerperal pyrexia, 149; cerebro-spinal fever, 42; acute poliomyelitis, 5; acute polio-encephalitis, 1; encephalitis lethargica, 9; relapsing fever, 1 (Kendal); continued fever, 1 (Poplar); dysentery, 25; ophthalmia neonatorum, 76.

The number of cases in the Infectious Hospitals of the London County Council on Jan. 22nd was 3852, which included: Scarlet fever, 898; diphtheria, 1034; measles, 15; whooping-cough, 552; puerperal fever, 19 mothers (plus 5 babies); encephalitis lethargica, 284; poliomyelitis, 2. At St. Margaret's Hospital there were 14 babies (plus 5 mothers) with ophthalmia neonatorum.

Deaths.—In 122 great towns, including London, there was no death from small-pox or enteric fever, 11 (0) from measles, 7 (2) from scarlet fever, 29 (7) from whooping-cough, 42 (3) from diphtheria, 41 (9) from diarrhœa and enteritis under two years, and 1100 (344) from influenza. The figures in parentheses are those for London itself.

Oxford reported 3 deaths from measles, Stoke-on-Trent and Swansea each 2. The whooping-cough deaths were widely scattered in ones and twos over 19 great towns outside London. Fatal cases of diphtheria were reported from 24 great towns, Liverpool 7, Hull 5, Manchester 4, Birmingham 3.

The number of stillbirths notified during the week was 267 (corresponding to a rate of 42 per 1000 total births), including 46 in London.

GUY'S HOSPITAL MEDICAL SCHOOL.—An important extension is now being built at Guy's which will centralise the whole medical school in one block of buildings with easy access between the various departments. In the new building a large and modern pathological department with plenty of accommodation for research, &c., will be provided, the departments of pathology, bacteriology, and clinical chemistry will be housed under one roof, there will be adequate accommodation for the medical research unit and clinical research fellow, and also for the pharmacological department, while the physics department will be made large enough to prevent the necessity of the duplicating of classes. Other improvements will be an extension of the research accommodation available in the physiological department, an additional demonstrator's laboratory, and an extension to the dissecting room, and a staff common room. The removal of the physics department from the existing buildings will enable better accommodation to be found in the school for operative surgery and for X ray living anatomy and human physiology.

MEDICAL NEWS

University of Oxford

On Jan. 21st the degree of doctor of medicine was conferred on F. W. Brown and of bachelor of medicine on A. H. M. Richards. Dr. A. E. Barclay was incorporated as D.M. from Christ's College, Cambridge.

An election to the Philip Walker studentship in pathology will be made shortly.

The studentship is tenable for three years, and may be extended for another two. It carries a stipend of between £300 and £350, and the student will be expected to devote his full time to pathological research, though he may hold a demonstratorship in the department of pathology. Applications should be sent to the registrar not later than April 24th. Further details will be found in our advertisement columns.

University of Cambridge

On Jan. 28th the following degrees were conferred:—

M.B., B.Chir.—D. A. S. Blair, R. F. Jarrett, R. Kauntze, and J. Wilson.

M.B.—*R. B. Davis and A. G. Salaman.

B.Chir.—A. M. Barry, F. G. A. Beckett, *H. C. Maclaren, C. McNeil, *K. M. Mayall, H. K. Meller, *A. M.-M. Payne, *K. W. B. Rostron, and O. N. Roussel.

* By proxy.

University of London

The title of reader in physiology in the University has been conferred on Dr. W. H. Newton in respect of the post held by him at University College.

The Geoffrey Duveen travelling studentship in otorhinolaryngology has been awarded to Mr. P. G. Scott, chief assistant to the ear department of St. Bartholomew's Hospital.

University of Edinburgh

The Cameron prize for 1937 has been awarded to Dr. J. B. Collip, F.R.S., professor of biochemistry in McGill University, Montreal, in recognition of his many contributions to endocrine therapy, and in particular of his work on the parathyroid gland.

Chadwick Lectures

Four lectures on improved methods and materials employed in building, following on the two Bossom lectures delivered in December, will be given at the Royal Institute of British Architects, 66, Portland-place, London, W., on Tuesdays, Feb. 2nd and 16th and March 2nd and 16th, at 6 P.M. Further information may be had from that secretary of the trust, 204, Abbey House, London, S.W.1.

British College of Obstetricians and Gynæcologists

The quarterly meeting of the council of the College was held on Jan. 23rd with Sir Ewen Maclean, the president, in the chair. Gora Chand Nandi (Calcutta) and Mangaldas Mehta (Bombay) were admitted to the membership, to which the following were also elected:—

Geoffrey Sheddan Adam, Australia; Richard Francis William Kinkead Allen, India; Doris Crystal Bates, Manchester; Francis Arthur Bellingham, Australia; Edith Brown, India; Harold Henry Caple, Canada; William Clement, Glasgow; Duncan Iain Finlayson, Birmingham; William Frame Flint, Glasgow; Phillip Joseph Ganner, Birmingham; Arthur Lionel Gilbey, Portsmouth; Uma Pati Gupta, India; William Hunter, Newcastle-upon-Tyne; Claude Wilfred Alfred Kimbell, New Zealand; William Alexander Liston, Edinburgh; John Robertson McArthur, Canada; William Leonard MacCormac and Barbara Martin Macewen, London; Margaret Martin McDowell, Halifax; Kelvin Alexander McGarrity, London and Australia; Gerald Maizels, London; Gladys Helen Marchant, India; Charles Ferdinand Marks, Sheffield; William Ian Clinch Morris, Edinburgh; Harry Stafford Morton and Bryan Charles Murless, London; Dudley Clifford Racker, Louis Rich, and Charles Bernard Edward Rickards, Manchester; George Walter Robson, Canada; John Myrtle Sanson, Edinburgh; Jacobus Wynand Schabort, South Africa; Lydia Torrance, India; William Waddell, South Africa; and Stanley William Wright, Newcastle, Staffs.

The council elected committees in India: for the provinces of Bengal, Assam, and Orissa; for the Bombay Presidency; for the Madras Presidency, Mysore, Travancore and Hyderabad; for the United and Central Provinces and Bihar; and for the Punjab, North West Frontier Province and Sind. The function of these committees will be to consider any matter bearing upon obstetrics and gynæcology in their respective area and to report to the council.

Society of Apothecaries of London

At recent examinations the following candidates were successful:—

Surgery.—A. Bagon, Univ. of Manch.; E. E. Bullock, Univ. of Leeds; F. J. H. D. De Marigny and P. A. Gardiner, Guy's Hosp.; F. W. McKenna, Univ. of Sheff.; J. Meynell, Univ. of Manch.; A. P. Mittra, Royal Colleges, Edin.; and F. L. Skinner, Univ. of McGill.

Medicine.—J. E. R. Palmer, St. Mary's Hosp.; and W. W. Willson, Univ. of Oxford and St. Mary's Hosp.

Forensic Medicine.—J. E. R. Palmer, St. Mary's Hosp.; and W. W. Willson, Univ. of Oxford and St. Mary's Hosp.

Midwifery.—A. A. Beazeley, Guy's Hosp.; I. W. Claiman, Univ. of Manch.; R. M. Coplans and D. S. Edwards, Middlesex Hosp.; J. Meynell, Univ. of Manch.; C. T. Tahil, Univ. of Edin.; and W. G. Tillman, Guy's Hosp.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery, and midwifery: F. J. H. D. De Marigny and A. P. Mittra.

Hunterian Society

On Wednesday, Feb. 17th, at the May Fair Hotel, Berkeley-street, W., this society is holding a banquet to commemorate the 209th anniversary of the birth of John Hunter. The hon. secretary is Mr. A. E. Porritt, 27, Harley-street, London, W.1.

Listerian Society

A meeting of this society will be held at King's College Hospital on Wednesday, Feb. 10th, at 8.30 P.M., when Dr. Alan Gregg, medical secretary of the Rockefeller Foundation, New York, will speak on psychological research. All medical practitioners are invited to attend.

Pharmaceutical Society of Great Britain

A lecture on the Addendum 1936 to the British Pharmacopœia 1932 will be given by Dr. C. H. Hampshire, secretary to the Pharmacopœia Commission, at the house of this society, 17, Bloomsbury-square, W.C., on Feb. 9th at 8.30 P.M.

Association of Clinical Pathologists

On Saturday, Jan. 30th, the tenth annual meeting of this association will be held at the British Postgraduate Medical School, Ducane-road, London, W. The morning session will begin at 9.30 A.M., and there will be a discussion on the diagnosis of gonorrhœa in which Dr. G. W. Goodhart, Dr. J. O. Oliver, and Dr. Orpwood Price will take part. At 11.30 A.M. short papers on the diagnosis of syphilis will be read by Dr. J. G. Greenfield, Dr. A. G. Signy, and Dr. H. C. Lucey. In the afternoon, from 2 to 4 P.M., demonstrations will be given by Dr. John Gray, Mr. E. J. King, Ph.D., and Mr. G. A. D. Haslewood, Dr. A. A. Miles and Dr. J. Gray, and Dr. Janet Vaughan. On the Friday evening before the meeting a dinner will be held at 7.30 P.M. at the Holborn Restaurant, W.C., after which the president-elect, Dr. S. C. Dyke, will open a discussion on the present and future status of the clinical pathologist.

Ella Sachs Plotz Foundation

The trustees of this foundation are anxiqus to make known the resources of their fund for the advancement of scientific investigation. The foundation seldom or never offers stipends to investigators; nor does it provide apparatus and materials which are ordinarily part of laboratory equipment. Its special purpose is to give grants for the purchase of apparatus and supplies required for special investigations and for the payment of unusual expenses, including technical assistance. The research should bear closely on medicine or surgery, and the maximum size of grants will usually be less than $500. In the thirteen years of its existence the foundation has made 282 grants and investigators have been aided in 29 countries. Applications for assistance should arrive before May 1st, including statements about the nature of the investigation, the amount of money wanted, and the way in which it will be spent. The secretary of the executive is Dr. Joseph C. Aub, Collis P. Huntington Memorial Hospital, 695, Huntington-avenue, Boston, Massachusetts, U.S.A.

Sir Stanley Woodwark, physician to the Westminster Hospital, has been elected chairman of the justices of the peace for the county of London acting in the division of St. Marylebone for 1937. He is a deputy lieutenant for the county.

Royal Society of Arts

On Wednesday, Feb. 3rd, at 8.15 P.M., Lieut.-Colonel Sir Arnold Wilson will speak to this society at its house in John-street, Adelphi, W.C., on working-class insurance. Tickets of admission may be had from the secretary.

Society for Constructive Birth Control

On Wednesday, Feb. 3rd, at 2.30 P.M., a practical demonstration of the technique of the use of a variety of contraceptive methods will be given by Mrs. Marie Stopes D.Sc., and Dr. Evelyn Fisher. Medical practitioners and senior students should apply for tickets to the hon. secretary of the society, 108, Whitfield-street, London, W.1.

Grocers' Company Scholarships

To encourage original medical research the Grocers' Company offers three scholarships, each of £300 a year with allowances. The next election will take place in May, and further particulars will be found in our advertisement columns.

British Association of Radiologists

On Friday, Feb. 19th, at 5.30 P.M., at 1, Wimpole-street, London, W., Dr. E. Lysholm, of Stockholm, will address a meeting of this society, to which all medical practitioners are invited. He will speak on radiological possibilities of demonstrating the exact location, size, and pathology of intracranial expansive processes.

Superannuation for Nurses and Hospital Officers

It is nine years since King Edward's Hospital Fund for London initiated the federated superannuation scheme for nurses and hospital officers, in which 1066 institutions all over the world now take part. Nurses and hospital officers are now able, before joining the service, to assure themselves of a pension on retirement. Full particulars can be obtained from the secretary of the Scheme, 21, Cavendish-square, London, W.1.

Royal Sanitary Institute

A discussion on the house as a home (design, construction, and equipment as they affect comfort) will take place at a meeting at the Royal Sanitary Institute, 90, Buckingham Palace-road, London, S.W., on Thursday, Feb. 18th, at 2.30 P.M. The discussion will be opened by Dr. H. A. Fawcett, principal assistant medical officer of the housing section of the public health department of the London County Council, Mr. Percival T. Harrison, borough engineer and surveyor for Finchley, and Mr. H. H. Clay, divisional assistant to the division of public health of the London School of Hygiene and Tropical Medicine.

Appointments

GOLDIE, WILLIAM, M.B. Aberd., M.R.C.P. Edin., has been appointed Research Worker in Arthritis at the Leeds Public Dispensary and Hospital.

GUSACK, I. B., M.B. Durh., Whole-time Assistant to the Newcastle-upon-Tyne Radium Centre.

HEGARTY, MARGARET J., M.B. Belf., D.P.H., Assistant Welfare Medical Officer for the County of Durham.

LEYSHON, V. N., M.D. Lond., Assistant Medical Officer for Rotherham.

MARSHALL, C. JENNINGS, M.D., M.S. Lond., F.R.C.S. Eng., Visiting Surgeon to the Kingston and District Hospital.

SPINK, M. S., M.D. Camb., Assistant Bacteriologist and Pathologist at the Jessop Hospital for Women, Sheffield.

London Homœopathic Hospital.—The following appointments are announced:—

SCHWABACHER, HERTA, M.R.C.S. Eng., Pathologist and Bacteriologist;

TUCKER, W. E., B.Ch. Camb., F.R.C.S., Surgeon in Charge of the Orthopædic and Mechanotherapy Department; and

SCOULAR, L. G., M.B. Glasg., D.O.M.S., Surgeon for Diseases of the Eye.

Certifying Surgeons under the Factory and Workshop Acts: Dr. J. IRVING (Brigstock District, Northampton); Dr. A. P. BROWN (Ebbw Vale District, Monmouth); and Dr. G. D. G. CAMERON (Grassington District, Yorks) (W.R.).

Vacancies

For further information refer to the advertisement columns

Altrincham, Cheshire, St. Anne's Home.—Res. Surg. O., £200.
Bath, Royal United Hosp.—Two H.S.'s to Special Depts. Also H.P., each at rate of £150.
Bedfordshire County Council.—Asst. County M.O.H., &c, £800.
Birmingham, Little Bromwich Hosp. for Infectious Diseases.—Jun. Res. M.O., £300.
Birmingham Maternity Hosp.—Res. Med. O. and Reg., £200.
Bradford Royal Infirmary.—Res. Surg. O., £250.
Bristol City and County.—Asst. M.O.H., £500.
British College of Obstetricians and Gynæcologists, 58, Queen Anne-street, W.—Res. Librarian, £400.
Bury County Borough.—Deputy M.O.H., £750.
Chelmsford and Essex Hosp.—H.P. and H.S., each £150.
Chester, County Mental Hosp.—Deputy Med. Supt. £675.
Chesterfield and North Derbyshire Royal Hosp.—H.S., at rate of £150.
City of London Hosp. for Diseases of the Heart and Lungs, Victoria Park, E.—H.P., at rate of £100.
Colonial Medical Service.—Thirty Vacancies, £600–£700.
Dewsbury and District General Infirmary.—Second H.S., £150.
East Ham Memorial Hosp., Shrewsbury-road, E.—H.P., at rate of £150.
Elizabeth Garrett Anderson Hosp., Euston-road, N.W.—Asst. Radiologist, £100.
Gloucester, Barnwood House Registered Mental Hosp.—Med. Supt., £1500.
Great Yarmouth General Hosp.—H.S., £140.
Grimsby and District Hosp.—Surgeon for Orthopædic Dept., and Fracture Clinic, £350.
Grocers' Company, Grocers' Hall, E.C.—Three Medical Res. Scholarships, each £300.
Guildford, Royal Surrey County Hosp.—H.S., at rate of £150.
Hereford, Herefordshire General Hosp.—Hon. Physician for Cardiological Dept.
Hosp. of St. John and St. Elizabeth, 60, Grove End-road, N.W.—Clin. Asst. in X Ray Dept., £75.
Huddersfield Royal Infirmary.—Cas. O., at rate of £200. Also H.P. and Res. Anæsthetist, at rate of £150.
Ilford, King George Hosp.—Hon. Physician.
Lancaster, Royal Albert Institution for the Feeble Minded.—Res. Jun. Asst. M.O., £375.
L.C.C.—Asst. MO.'s, Grade I and II, £350 and £250 respectively.
Leeds Public Dispensary and Hosp., North-street.—Anæsthetist, 25 guineas.
Liverpool and District Hosp. for Diseases of the Heart.—H.P., £100.
Liverpool, Royal Southern Hosp.—Hon. Asst. Orthopædic Surgeon.
Liverpool Sanatorium, Delamere Forest, Frodsham.—Sen. and Jun. Assts., £325 and £225 respectively.
London Hosp., E.—Paterson Research Scholar and Chief Asst. for Cardiac Dept., £400.
Maidstone, Kent County Ophthalmic Hosp.—H.S. to Ear, Nose, and Throat Dept., at rate of £250.
Maidstone, West Kent General Hosp.—H.P., £175.
Manchester, Booth Hall Hosp. for Children.—Res. Asst. M.O., at rate of £200.
Newcastle General Hosp.—Venereal Diseases Clinic M.O., £800.
Newcastle-upon-Tyne, Barrasford Sanatorium.—Res. Med. Asst., £250.
Newport County Borough.—Asst. M.O.H., £500.
Northampton, Mental Hosp., Berrywood.—Third Asst. M.O., £450.
Norwich, Norfolk, and Norwich Hosp.—H.S. to Special Depts., £120.
Nottingham General Hosp.—H.S. for Fracture and Orthopædic Depts., £300.
Oxford University.—Philip Walker Studentship in Pathology, £300.
Oxford, Wingfield Morris Orthopædic Hosp., Headington.—Res. H.S., £100.
Pendlebury, Royal Manchester Children's Hosp.—Asst. M.O. for Out-patients' Dept., at rate of £150.
Plymouth, Prince of Wales's Hosp., Devonport.—H.S., at rate of £150. Also Jun. H.S. and Res. Anæsthetist and H.S. to Special Depts., each at rate of £120.
Portsmouth City.—Asst. Dental Surgeon, £450.
Princess Elizabeth of York Hosp. for Children, Shadwell, E.—Asst. Surg.
Queen Charlotte's Maternity Hosp., Marylebone-road, N.W.—Res. M.O. for Isolation Hosp., at rate of £200.
Queen's Hosp. for Children, Hackney-road, E.—Cas. O. At rate of £100.
Queen Mary's Hosp. for the East End, E.—Hon. Asst. Physician to Psychological Medicine Dept.
Reading, Royal Berkshire Hosp.—Res. Anæsthetist, £250.
Royal Air Force Medical Service.—Commissions.
Royal Cancer Hosp., Fulham-road, S.W.—H.S. to Radium Dept., at rate of £100.
Royal Free Hosp., Gray's Inn-road, W.C.—Hon. Asst. Physician.
Royal Northern Hosp., Holloway, N.—H.P., also Obstet. H.S., each at rate of £70.
Ryde, Royal Isle of Wight County Hospital.—Jun. H.S., £120.
St. Bartholomew's Hosp., E.C.—Dental H.S., at rate of £80.
St. John's Hosp., Lewisham, S.E.—Res. H.P. and Cas. O., each at rate of £100.
Sheffield Royal Hosp.—Two Clin. Assts., each £300.
South Shields, Ingham Infirmary.—Sen. and Jun. H.S.'s, £200 and £150 respectively.
Spanish Medical Aid.—Surgeon.
Stockport County Borough.—Sen. Asst. M.O.H. and Clin. Tuber. O., £750.
Swansea, Hill House Infectious Diseases Hosp.—Res. M.O., £350.

Tunbridge Wells, Kent and Sussex Hosp.—Res. Surg. O., £250.
University of London, W.C.—University Studentship in Physiology, £100.
Wallasey, Victoria Central Hosp.—Hon. Asst. Orthopædic Surgeon.
West End Hosp. for Nervous Diseases, 73, Welbeck-street, W.—Hon. Medical Psychologist for Child Guidance Dept.
Wolverhampton Royal Hosp.—H.S., at rate of £100.
Woolwich and District War Memorial Hosp., Shooters Hill, S.E.—Res. M.O., £175. Also H.S., at rate of £100.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Newbury (Berks), Fillongley (Warwick), and Dornoch (Sutherland).

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
TUESDAY, Feb. 2nd.
Orthopædics. 5 P.M. Mr. B. Whitchurch Howell: Distraction of Joints. (Presidential address.)
Pathology. 8.15 for 8.30 P.M. (inoculation department, St. Mary's Hospital, W.), H. B. Day: 1. Bilharzial Disease of the Lungs. I. Doniach and D. E. Price: 2. Hyperchromic Anæmia in an Infant. E. W. Fish: 3. Dental Sepsis. A. Fleming: 4. The Effect of Chemicals on the Growth of Tubercle Bacilli in Human Blood. 5. A Method of Making Museum Specimens of Mould Cultures. A. C. Fraser and H. C. Stewart: 6. Detoxication and Serum Particles. R. M. Fry and E. D. Hoare: 7. Some Anærobic Gram-negative Bacilli from Blood Cultures. A. T. Fuller: 8. Estimation of *p*-aminobenzenesulphonamide in Biological Material. 9. A Method for the Extraction of Polysaccharride Haptens from Bacteria. D. Harley: 10. Bacterial Allergy and Immunity with Reference to the Pneumococcus. G. E. Harre and W. D. Newcomb: 11. Recent Additions to the Museum. L. Holt: 12. Stability of Staphylococcus-*a*-toxoid. 13. Function of Agar in Staphylococcus-*a*-toxin Production. A. St. G. Huggett: 14. Experiments in Delayed Blood Coagulation. W. Howard Hughes: 15. The Antibacterial Effect of Inflammatory Sera and Exudates. A. Macgregor: 16. Lymphatic System of Teeth and Jaws. I. H. Maclean: 17. A Method of growing *B. pertussis* in Fluid Cultures. D. M. Pryce: 18. Carcinoma of Jejunum in Man and Guinea-pig. 19. Cerebral Aplasia with Adrenal Changes. 20. Chylous Ascites. Sir Almroth Wright and K. B. Rogers: 21. The Growth of Tubercle Bacilli in Blood. 22. The Vaccine Response Test—Method of Carrying Out the Procedure.
WEDNESDAY.
History of Medicine. 5 P.M. Dr. W. H. S. Jones: The Playground of Scientists. Dr. Max Meyerhof: Early Mention of Sleeping Sickness in Arabic Literature.
Surgery. 8.30 P.M. Mr. Harry Platt and Sir Robert Stanton Woods: Injuries of the Peripheral Nerves.
FRIDAY.
Otology. 10.30 A.M. (Cases at 9.30 A.M.) Prof. Laskiewicz (Poland): On the Diagnosis of Cerebral Abscess Progressing Towards the Lateral Ventricle. Mr. A. Tumarkin: Some Observations on the Functions of the Labyrinth.
Anæsthetics and Laryngology. 5 P.M. Mr. H. E. G. Boyle, Dr. A. W. Matthew, Dr. J. H. T. Challis, Mr. T. B. Layton, Mr. W. S. Thacker-Neville, and Mr. D. F. A. Neilson: The Choice and Technique of Anæsthetics for Nose and Throat Operations.
Otology and United Services. 8.30 P.M. Major John Hare, Group Capt. David Ranken, Surgeon Lieut.-Commander V. G. Horan, Mr. E. B. Waggett, Mr. E. D. D. Davis, and Mr. Terence Cawthorne: Effect of Aural Conditions on Fitness for Active Service.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn-fields, W.C.
MONDAY, Feb. 1st.—5 P.M., Mr. Philip Wiles: Postural Deformities of the Spine.
WEDNESDAY.—5 P.M., Mrs. Philippa Martin: The Effect on the Eye of Radium Used for Treatment of Malignant Disease in the Neighbourhood.
FRIDAY.—5 P.M., Mr. J. H. Saint: The BIPP Method of Treatment of Acute Osteitis. (Hunterian lectures.)

BRITISH POSTGRADUATE MEDICAL SCHOOL.
MONDAY, Feb. 1st.—2.30 P.M., Dr. H. MacLean: Nephritis and Allied Conditions.
TUESDAY.—2 P.M., Mr. E. King, Ph.D.: Hepatic Function and Jaundice.
WEDNESDAY.—Noon, clinical and pathological conference (medical). 2.30 P.M., clinical and pathological conference (surgical). 4.30 P.M., Mr. A. S. Parkes, F.R.S.: Experimental Endocrinology.
THURSDAY.—Noon, clinical and pathological conference (obstetrics and gynæcology). 2.30 P.M., Dr. Duncan White: radiological demonstration. 3.30 P.M., Dr. A. A. Moncrieff: Feeding of the New-born Infant (Breast and Artificial).
FRIDAY.—2 P.M., operative obstetrics. 2.30 P.M., Mr. W. B. Gabriel: Surgical Diseases of the Rectum. 3 P.M., department of gynæcology, pathological demonstration.
Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics and operations, obstetrical and gynæcological clinics and operations.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.
MONDAY, Feb. 1st.—10 A.M., skin clinic. 11 A.M., surgical wards. 2 P.M., operations, surgical and gynæcological wards, medical, surgical, and gynæcological clinics. 4.15 P.M., Mr. Arnold Walker: Uterine Inertia.
TUESDAY.—10 A.M., medical wards. 11 A.M., surgical wards. 2 P.M., operations, medical, surgical, and throat clinics. 4.15 P.M., Dr. Hugh Gordon: The Internal Treatment of Skin Diseases.
WEDNESDAY.—10 A.M., children's ward and clinic. 11 A.M., medical wards. 2 P.M., gynæcological operations, medical, surgical, and eye clinics. 4.15 P.M., Dr. Grainger Stewart: Subarachnoid Hæmorrhage.
THURSDAY.—10 A.M., neurological and gynæcological clinics. Noon, fracture clinic. 2 P.M., operations, medical, surgical, and genito-urinary and eye clinics. 4.15 P.M., Dr. O. Carden Sibley: Anæsthesia for Oral Cases.
FRIDAY.—10 A.M., medical wards, skin clinic. Noon, lecture on treatment. 2 P.M., operations, medical, surgical, and throat clinics. 4.15 P.M., Mr. Grant Batchelor: Surgical Lecture.
SATURDAY.—10 A.M., children's and surgical clinic. 11 A.M., medical wards.
The lectures at 4.15 P.M. are open to all medical practitioners without fee.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, Feb. 1st, to SATURDAY, Feb. 6th.—ST. JOHN'S HOSPITAL, Leicester-square, W.C., afternoon course in dermatology (open to non-members).—NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W., Tues., 8.30 P.M., Mr. Holmes Sellors: Kidney and Bladder. Thurs., 8.30 P.M., Mr. A. M. Boyd: Tongue.—Courses arranged by the fellowship are open only to members.

NATIONAL HOSPITAL, Queen-square, W.C.
MONDAY, Feb. 1st.—3.30 P.M., Dr. Symonds: Cerebral Tumours (I).
TUESDAY.—3.30 P.M., Dr. Denny-Brown: The Peripheral Mechanism of Sensation.
WEDNESDAY.—3.30 P.M., Dr. Kinnier Wilson: Clinical Demonstration.
THURSDAY.—3.30 P.M., Dr. Gordon Holmes, F.R.S.: Neurosyphilis (II).
FRIDAY.—3.30 P.M., Dr. Denny-Brown: The Peripheral Mechanism of Sensation.
Out-patient clinic daily at 2 P.M.

LONDON SCHOOL OF DERMATOLOGY, 5, Lisle-street, W.C.
TUESDAY, Feb. 2nd.—5 P.M., Dr. J. E. M. Wigley: Tuberculosis Cutis.
THURSDAY.—5 P.M., Dr. R. T. Brain: Erythematosquamous Eruptions.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.
THURSDAY, Feb. 4th.—2 P.M., Mr. Charles Donald: The Use of Encephalography and Ventriculography. 3 P.M., Dr. W. G. Wyllie: Therapeutic Measures in Diseases of the Nervous System.
Out-patient clinics daily at 10 A.M. and ward visits at 2 P.M.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.
FRIDAY, Feb. 5th.—4 P.M., Mr. W. A. Mill: Earache in Normal Ear.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland-street, W.
TUESDAY, Feb. 2nd.—5.30 P.M., Dr. John Parkinson: Heart Attacks.

ST. JOHN CLINIC AND INSTITUTE OF PHYSICAL MEDICINE, 42, Ranelagh-road, S.W.
FRIDAY, Feb. 5th.—4.30 P.M., Sir Leonard Hill, F.R.S.: The Physiological Action of Methods of Treatment in Rheumatic Diseases.

SOUTH-WEST LONDON POST-GRADUATE ASSOCIATION, St. James' Hospital, Ouseley-road, S.W.
WEDNESDAY, Feb. 3rd.—4 P.M., Dr. W. E. Lloyd: The Failing Heart.

LEEDS GENERAL INFIRMARY.
TUESDAY, Feb. 2nd.—3.30 P.M., Dr. Burrow: Referred Pain.

ST. MARY'S HOSPITALS, Manchester.
THURSDAY, Feb. 4th.—4.15 P.M. (Whitworth-street West Hospital), Dr. J. W. A. Hunter: Forceps Delivery.

GLASGOW POSTGRADUATE MEDICAL ASSOCIATION.
WEDNESDAY, Feb. 3rd.—4.15 P.M. (Royal Hospital for Sick Children), Mr. Matthew White: Hæmaturia in Childhood.

SUNDAY FILMS AND BIRMINGHAM HOSPITALS.—The sum of £9000 has been allocated for distribution among the Birmingham hospitals under the Sunday Entertainments Act.

NOTES, COMMENTS, AND ABSTRACTS

NEW GROWTHS IN ANIMALS

THE tumours of domestic animals are of little economic importance, and have therefore been little studied. A possible explanation of their apparent rarity is that few domestic animals survive to old age. This explanation is supported by the fact that in dogs, which often die a natural death, new growths are not uncommon. On the other hand, if they often caused death in cats or horses the fact would be recognised.

Apart from the transmissible tumours of birds, which have been carefully studied, not much is known about animal neoplasms, and text-books on the subject are scarce and incomplete, consisting almost entirely of rather elementary morphological descriptions, many of them based on too few cases. In an attempt to fill some of the gaps C. Jackson in South Africa has classified and described all the new growths in the Onderstepoort collection of pathological specimens, and records his findings in the *Onderstepoort Journal* (1936, **6**, 1). The collection of some 18,000 specimens contains only 600 neoplasms, and this illustrates their relative unimportance in veterinary pathology. It is necessary to mention, however, what type of material is likely to find its way to the laboratory. Onderstepoort, as the centre of veterinary research in South Africa, is fed by Government veterinary officers in the field and by municipal officers such as abattoir inspectors; but the bulk of material is collected during post-mortem examinations carried out at the laboratory. All species of farm animals are examined but because many aged horses are used for virus and antiserum production more examinations are made of aged horses than of aged animals of other species. In all, 119 tumours were examined from horses, 108 from cattle, 39 from sheep, 46 from goats, 4 from pigs, 72 from dogs, 2 from cats, and 203 from poultry. The attention nowadays paid to lympho-granulomatous conditions of birds (e.g., fowl paralysis, Marek's disease, Newcastle disease) makes it probable that a more careful search is made for tumours in birds than in mammals. Comparatively few dogs and cats are sent to the laboratory in the course of ordinary routine, and Jackson must have largely depended on the coöperation of a very small group of private practitioners in obtaining material from domestic pets.

Thus the "species incidence of animals tumours" as recorded by Jackson cannot be considered as a true random selection amongst species. This is particularly evident when one considers the relatively small number of tumours from dogs—a result partly of the lack of post-mortem material and partly of the shortness of the life of dogs in South Africa compared with England. For various reasons, including disease and neglect, many dogs never pass maturity in South Africa, and comparatively few receive skilled veterinary attention. In England, on the other hand, the majority survive distemper and the perils of the road to reach a ripe old age. Even the poorest owners manage to find the modest shilling which ensures attention for their pets when sick, and the presence of neoplasms is thus brought to the attention of pathologists and a vast amount of material is available for investigation. Hitherto little has been done to make adequate use of such material, but Jackson's example may stimulate others to cover the ground he has been forced to neglect.

In reporting his results Jackson gives little notice to tumours that are easily diagnosed, and describes in detail those he found hard to classify. Besides recording simple morphological features, he has made nuclear : Nucleolar (n : N) ratio estimations and estimations of mitotic indices, has examined the significance of other nuclear inclusions, and has investigated the intracellular matrix of different kinds of tumours.

A quick and reasonably accurate method was evolved for estimating the n : N ratio by means of a "dot-and-circle graticule" inserted into the ocular of the microscope. As regards the interpretation of the n : N ratio, Jackson emphasises that attention must be paid to the n : N ratio of normal cells of the particular tissue under consideration before any significance can be attached to this ratio in tumour cells. In using the n : N ratio as an index of malignancy this term must be understood to embrace not only metastasis but also very rapid invasive growth. The difficulties underlying the interpretation of the mitotic index include a lack of knowledge of the rate of division of nuclei of different types of normal cells in various animal species, and of the part played by amitotic division in the growth of animal tumours. Furthermore, the difference between the mitotic indices of benign and malignant tumours is merely one of degree, there being no clear-cut line of demarcation. Nevertheless the mitotic index does serve to express with some precision statements such as "mitotic figures are frequent."

Average mitotic indices have been worked out for some of the commoner tumours, but the case-groups were usually too small. In 11 canine contagious venereal tumours the average was 6·6. In 39 acanthomata from various species it was 5·0. It is noteworthy that in 6 canine basal-celled epitheliomata it was only 1·8. Apart from the contagious venereal tumours and acanthomata, which had maximum indices of 15 and 13 respectively, the maximum indices encountered in other tumours were surprisingly low. In estimating the mitotic index of a tumour, a count was prepared in a part of the field showing most mitosis, the object being to learn "the worst" of any growth.

Jackson groups his tumours according to the tissue of origin—epithelium, mesothelium, and endothelium—and provides many excellent photographs and photomicrographs. Where suitable material was available the histogenesis has been studied and the resulting discussions are unique and valuable. The tumours recorded for the first time include carcinoma of the small intestine and carcinoma of the pancreas of the sheep, thymoma in the goat, embryonal nephroma in the horse, gliomas in the brain of the fowl, cutaneous neurofibromatosis in the fowl, probable sympathogonioma of the base of the dog's heart, (reticulo-) endothelioma of the liver and spleen of the sheep, pericardial mesothelioma in the horse, and myolipoma of the vagina of the bitch. A special study has been made of certain epitheliomata of fowls and sheep, characterised by excessive keratinisation of the cornu cutaneum. Also an attempt has been made to classify certain cutaneous and apparently contagious neoplasms, commonly found in equines in South Africa, which seem to stand half-way between the granulomata and sarcomata. As many as 37 per cent. of the tumours of equines fall into this category, for which the name "sarcoid" is suggested.

The tumours commonly found in the various animal species are placed in the following order of numerical importance :—

Equines.—Sarcoids, acanthoma, melanotic sarcoma, gland-celled carcinoma.

Cattle.—Acanthoma, gland-celled carcinoma, papilloma, false neuroma.

Sheep.—Gland-celled carcinoma, acanthoma.

Goat.—Acanthoma, melanotic epithelioma.

Dog.—Contagious (venereal) tumours, acanthoma, basocellular epithelioma.

Poultry.—Lymphocytoma, gland-celled carcinoma, leiomyoma, mixed-cell sarcoma.

Other types of tumour constituted less than about 5 per cent. of the total tumours in each animal species.

COLDS AND INFLUENZA

MOST of us would like to know "How to Escape Colds and Influenza," but the booklet with this title, written for the laity by "a well-known bacteriologist" and "a London physician," and published by Leonard Hill, Ltd., 17, Stratford-place, London, W.1, at 6*d*., cannot be said to contribute anything very new towards solving the problem. The usual counsels about diet, clothing, cleanliness, and the avoidance of chill and fatigue are set forth, and paper handkerchiefs are recommended for those who have taken the infection. Unlike many, the authors put considerable faith in the usefulness of oral vaccines, but when emphasising the evils of under-ventilation and overfeeding they are on surer ground. Several appendices, interspersed with advertisements, are included. There is a note on the ionisation treatment of hay-fever as practised at St. George's Hospital, and the authors have coined in "a bombardment of germs" a new noun of assemblage. Some may think that here as elsewhere too much stress is laid upon the ubiquity of germs and not enough upon resistance to infection. More regard to the cultivation of physical hardihood, which is possible even in crowded cities, may be of greater prophylactic value than much gargling and spraying.

A note prefacing this little book says that "the etiquette of the medical profession does not permit the authors to append their names to a medical book written for laymen, but the publishers vouch for their high professional authority."

FATTY INFILTRATION

LATELY it has been shown that fatty changes in the liver and the heart are largely, perhaps entirely, the result of the infiltration of fat. In view of these findings Dr. John Duncan Hay has performed a series of experiments upon rabbits, investigating the effect of starvation on their kidneys, and he reported his results on Jan. 14th to the Liverpool Medical Institution. The rabbits had been starved for seven days and then killed. The amount of fat in the kidneys and its iodine value was estimated, a control series of unstarved rabbits being similarly investigated. The histological examination in the starved series demonstrated large amounts of isotropic fat in the kidneys, mainly in Henle's tubules. Chemically also the percentage of fat was shown to have been raised, and the close relationship between this and the amount seen in the sections proved that the fatty changes were largely due to infiltration. The degree of adiposity of the animals was estimated by weighing the intra-abdominal fat deposits, and was found also to be closely related to the amount of fat in the kidneys, estimated chemically and visually. This showed that the fatty changes in the starvation kidney depended on the amount of fat available in the rest of the body for mobilisation and transport. The results of the iodine value estimations were inconclusive, neither supporting nor seriously invalidating the conclusions drawn from the other findings.

In a discussion that followed Dr. Hay's paper, Dr. R. T. Chadwick commented on the observation that fatty infiltration took place in starved rabbits only when the animal had been originally well supplied with fat stores. He had noticed in the liver and kidneys of children dying of unrelieved pyloric stenosis that there was no trace of fatty infiltration, whereas fatty infiltration was conspicuous in the same organs of children dying of unrelieved intestinal obstruction, who were usually very well nourished. Dr. T. F. Hewer also said that Dr. Hay's views were in accord with what he himself had seen at autopsy in many cases. He instanced the examination of two persons dying from uncontrolled hæmorrhage, one an obese woman who had antepartum hæmorrhage for four days and the other an emaciated man with a gastric ulcer. The organs in the woman, who had abundant fat depôts, were heavily infiltrated with fat, while those of the man showed only a trace. There seems thus to be little doubt that in the kidney at least a high proportion of the visible fat in "fatty change" is derived by mobilisation from the fat depôts of the body.

CURIOUS ADVERTISING.—A practitioner in South London writes: "Surely modern ways of advertising are curious. The following telegram reached me before 8 o'clock one morning and appeared before opening to be an urgent message: Strongly recommend —— for personal protection and that of patients in present flu epidemic. (Signed)——. This will not redound to the popularity of the firm in question."

ANNUAL CHARITIES REGISTER, 1937.—We have received from Messrs. Longmans, Green and Co., Ltd., a copy of the forty-fourth edition of the register and digest of charities in or available for the metropolis (pp. 530, 8*s*. 6*d*.). In the prefatory note is a remark that much care has been expended on the index, and this is evident, for there are more than 3000 items on the 56 pages of the index, making it possible to turn up any desired information at a moment's notice. By dint of careful editing, revision, and concentration this book has become in the course of years a model of its kind; it is well-nigh indispensable for those engaged on public work of any sort within the metropolis.

"BURIED TREASURE."—In a leading article with this title last week a line dropped out of the penultimate sentence which should have read: In any case it is surely undesirable, if material is worth publishing at all, that the only medium chosen should be an un-indexed official report of which no account is taken in the Cumulative Index, the Zentralblatt or any of the other means of reference that psychiatrists use.

Births, Marriages, and Deaths

BIRTHS

HARWARD.—On Jan. 23rd, at Odiham, Hampshire, the wife of Dr. R. L. Harward, of a son.

MCLAUGHLIN.—On Jan. 15th, at Sheffield, the wife of Dr. A. I. G. McLaughlin, of a son.

STEWART.—On Jan. 25th, at Nuffield House, Guy's Hospital, the wife of Dr. G. R. Shipley Stewart, of Stafford, of a daughter.

TAIT.—On Jan. 25th, at Devonshire-place, W., the wife of Mr. Charles Tait, D.O.M.S., of Windsor, of a daughter.

VINE.—On Jan. 8th, at Ootacamund, S. India, the wife of Capt. R. S. Vine, R.A.M.C., of a daughter.

MARRIAGES

MANFORD—WOODWARD.—On Jan. 20th, at the Church of St. Ethelburga, Bishopsgate, John Stanley Manford, M.B., to Vera Constance Woodward, daughter of the late Mr. Louis G. Woodward, of Hove.

MURRAY—WILSON.—On Jan. 20th, at the Parish Church, Clevedon, Dr. W. Murray to Enid Dorothy, daughter of the late J. Grant Wilson, M.R.C.S., and Mrs. Wilson, of Clevedon.

DEATHS

COLLINS.—On Jan 22nd, at Ulverston, Lancs, Arthur Ward Collins, M.B. Vict., aged 77.

JOHNSTON.—On Dec. 23rd, on board s.s. *Clan Macaulay*, at or near Sydney, Alfred Lionel Johnston, L.R.C.P. Edin., previously in practice at Ramsgate.

KITCHING.—On Jan. 18th, at Cobham, Surrey, John Lea Walton Kitching, F.R.C.S. Edin., aged 76.

MACNIDDER.—On Jan. 22nd, at Hull, James MacNidder, M.D. Edin.

SHAW.—On Jan. 21st, at Chesham Bois, W. Vernon Shaw, O.B.E., M.D. Oxon.

WHITE.—On Jan. 18th, Thomas Edward White, M.D. Durh., of Streatham, formerly of Catford, aged 79.

WILTSHIRE.—On Jan. 18, at Bembridge, Isle of Wight, Harold Waterlow Wiltshire, D.S.O., M.D. Camb., F.R.C.P. Lond.

WITHERS.—On Jan. 23rd, at Sidmouth, Oliver Withers, M.D. Durh., late of Sale, Manchester, aged 79.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.